Quantitative Evaluation of King County Care Partners' Rethinking Care Intervention: Interim Analysis of Social and Health Outcomes

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EXECUTIVE SUMMARY

Approximately 5% of Medicaid beneficiaries generate more than 50% of related state spending.[1] *Rethinking Care* (RTC) provides community-based, registered nurse-led, multidisciplinary care management to high-cost Medicaid beneficiaries with behavioral health needs and multiple chronic conditions in King County, Washington.

An intent-to-treat approach was used to compare outcomes pre- and post-intervention for a subset of individuals randomized to the first RTC referral group (n = 390) and a propensity-score matched comparison group selected from a randomized waiting list (n = 390). Difference-in-differences regression models examined per member per month (PMPM) medical service use and costs, alcohol and drug treatment service use and cost, and criminal justice involvement. Models were adjusted for potential confounding variables and weighted by the number of post-intervention eligible member months.

Of those offered the RTC intervention, 63% completed an initial assessment and 51% set at least one care plan goal. Relative to the comparison group, the RTC group had lower PMPM psychiatric inpatient costs (-$40; p=0.09), fewer PMPM criminal charges (-0.02; p=0.04), higher odds of in-patient alcohol and drug treatment (OR=3.22; p=0.06) and higher PMPM in-patient alcohol and drug treatment costs ($18 PMPM; p=0.02) in the post-period.

Results for the RTC intervention are in the expected direction and, thus, promising. Intensive care management may benefit high-cost Medicaid clients and the state through reduced psychiatric inpatient costs, reduced criminal activity and higher use of alcohol and drug treatment.

[1] Washington State Department of Social and Health Services. Fact Sheet: Aging and Disability Services Administration Chronic Care Management Project. January 2010.

Background

Rethinking Care (RTC) is a four-state demonstration program developed by the Center for Healthcare Strategies (CHCS), a nonprofit health policy resource center dedicated to improving health care quality for Medicaid beneficiaries with complex and high-cost health care needs. RTC focuses on designing and testing new interventions for the 5 - 20 percent of Medicaid beneficiaries whose care needs account for a significant portion of state Medicaid expenditures. RTC has four overarching goals: 1) to identify patients most likely to benefit from enhanced care management; 2) to develop tailored care management interventions; 3) to implement interventions; and 4) to rigorously measure quality and cost outcomes of the interventions. The four-year RTC initiative began in 2008 with support from multiple funding sources.[2] This report provides preliminary results from the first year of the Washington State RTC program evaluation.

In Washington State, RTC was developed by with Washington State Health and Recovery Services Administration (HRSA) in the state Department of Social and Health Services (DSHS) with technical assistance from CHCS. It is an enhancement of the earlier pilot program King County Care Partners (KCCP). KCCP was initiated in early 2007 to provide chronic care management for Medicaid fee-for-service (FFS) adult Blind, Aged, and Disabled Medicaid patients who were identified as being in the top 20% of clients at risk of having future high medical expenses in King County, Washington. The KCCP program was a collaboration between City of Seattle Aging and Disability Services (ADS), Senior Services of King County, Harborview Medical Center (HMC), and four community health centers. It offered care management, health education and assistance, and coordination of medical services to eligible patients with the intent of improving quality of medical care and reducing medical costs.[3] An evaluation of the 2007 KCCP pilot program indicated that, of the 839 individuals offered the program, only 18% (or 153 individuals) agreed to participate. Preliminary results indicated no medical cost savings. However, the death rate was significantly lower for the group that was offered the program relative to a comparison group.[4]

Recruitment and Intervention

In February 2009, the RTC enhancement of the KCCP program was launched in collaboration with KCCP staff. The focus was on the subset of Blind, Aged, and Disabled Medicaid patients who also had evidence of mental illness and/or chemical dependency. All clients were Supplemental Security Income (SSI) recipients. The RTC intervention consists of community-based, registered nurse (RN)-led, multidisciplinary care management designed to empower clients and enhance coordination, communication, and integration of services across safety-net

[2] For more information and resources produced through the RTC initiative, visit www.chcs.org.
[3] Qualis Health (December 31, 2008). *Evaluation of Washington State Medicaid Chronic Care Management Projects. Qualitative Report*. Qualis Health.
[4] Court, B. & Mancuso, D. (October 14, 2008). *King County Care Partners Chronic Care Management Project. Savings/Cost Analysis*. Olympia, WA: Health and Recovery Services Administration, Washington State Department of Social and Health Services.

providers.[5] At-risk clients can receive up to two years of intensive care management from a clinical team of RNs and social workers. Care management includes an in-person comprehensive assessment; collaborative goal setting; chronic disease self-management coaching; physician visits of clients accompanied by their care managers; frequent in-person and phone monitoring; connection to community resources; and coordination of care across the medical and mental health system.[6]

To encourage participation in the RTC intervention, a variety of techniques were employed including client outreach efforts by a skilled survey research team.[7] The key elements of the RTC intervention are published in detail elsewhere.[8] Briefly, after clients agree to enroll, they are referred to a nurse-care manager for an initial in-person meeting and comprehensive assessment. This assessment takes approximately 60-90 minutes and includes administration of validated instruments to screen for common mental illness, substance abuse, and health literacy; assessment of chronic medical conditions, chronic pain, and functional status; review of medications; identification of psychosocial issues that may impact a client's ability to access care or follow through on care plans; and collaborative goal-setting that focuses on and takes account of the client's expressed needs, both medical and psychosocial. Subsequent contacts, either in-person or by telephone, with a nurse or social worker include: goal setting; coaching (e.g. , strategies to improve the quality of physician-client communication); self-advocacy; self-management; health system access and navigation; modeling (in joint visits to one or more physician appointments); ongoing social support; health care coordination; referral to primary, specialty and mental health care; and referral and connection with community resources.

Staff carrying out the intervention had access to comprehensive client health and demographic information extracted from a variety of administrative data sources. For example, staff could review an individual client's recent use of medical services including inpatient hospital and emergency department visits, diagnoses, and filled prescriptions in an easily navigated and clinically meaningful display. This tool served as a rich source of clinically-relevant data to inform care management interventions.[9]

The RTC evaluation was designed as a randomized controlled trial to allow for a rigorous evaluation of its impact. In December 2008, 1,524 clients were randomized to either a treatment group or a "wait list" group. The wait list group became eligible for the intervention

[5] For a description of a typical client served by RTC. see: Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (in press). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), Medicaid Care Management Best Practices. New York: John Wiley & Sons, Inc.

[6] Lessler, D. S., Krupski, A., Cristofalo, M. (in press). King County Care Partners: A community-based chronic care management system for Medicaid clients with co-occurring medical, mental and substance abuse disorders. In Schraeder, C. (Ed), Medicaid Care Management Best Practices. New York: John Wiley & Sons, Inc.

[7] Court, B. (July 28, 2010). Enhanced Client Engagement Project Report. Olympia, WA: Washington State Medicaid Purchasing Administration, Office of Quality and Care Management.
Also see http://www.chcs.org/publications3960/publications_show.htm?doc_id=1261169

[8] Lessler, D. S., Krupski, A., Cristofalo, M. (in press). King County Care Partners: A community-based chronic care management system for Medicaid clients with co-occurring medical, mental and substance abuse disorders. In Schraeder, C. (Ed), Medicaid Care Management Best Practices. New York: John Wiley & Sons, Inc.

[9] Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (in press). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), Medicaid Care Management Best Practices. New York: John Wiley & Sons, Inc.

at a later date. In February 2009, 200 of those randomized to the treatment group were randomly selected to be offered participation in the RTC intervention, and in March 2009, another 225 names were randomly selected from the treatment group to be offered participation (n = 425). The Center for Healthcare Improvement for Addictions, Mental Illness and Medically Vulnerable Populations (CHAMMP) at the University of Washington at Harborview Medical Center was commissioned by DSHS to carry out a quantitative evaluation of the RTC intervention. This report provides results of this evaluation.

Specific Aims

This quantitative evaluation aims to assess the impact of offering an intensive care management program to high-risk Medicaid clients on:

a) Medical costs and service use (i.e., total medical, emergency room, inpatient, long term residential services and in-home long-term care services, prescription drugs, psychiatric inpatient);
b) alcohol and drug treatment services; and
c) criminal arrests and charges, homelessness, and death.

Sample

To be eligible for participation in the RTC program, a client had to meet the following criteria **(Appendix A)**:

- Enrollment in the SSI Medicaid Categorically Needy program
- King County residence
- At least one encounter with KCCP
- At least one chronic physical condition and evidence of mental health problems, substance abuse, or both
- Predicted future health care costs at least 50% higher than those of the average Medicaid SSI client (risk score of 1.5 or higher).[10]

Of the 425 individuals randomly selected to be eligible for the RTC intervention, 35 were excluded from the evaluation because they lost Medicaid coverage, moved, became dual eligible (i.e., were enrolled in Medicaid and Medicare) or died before the index date. This evaluation is based on data from 390 clients. The report provides results from interim analyses covering the time from randomization through March 2010.

Evaluation Design

The evaluation compares outcomes in the pre- and post-intervention periods from all individuals randomized to receive the RTC intervention (RTC group; n = 390) to a subset of those in the wait list group (comparison group; n = 390). To estimate the effects of providing RTC to the target population, rather than its effects among those who use it, data from all clients in the RTC group were used, regardless of whether they engaged in the RTC intervention (Intent-to-Treat approach).

[10] Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (in press). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), Medicaid Care Management Best Practices. New York: John Wiley & Sons, Inc.

Only a subset of those who were initially randomized to receive the RTC intervention were invited to participate. Because this subset may not be a true random sample, a comparison group was selected to match the RTC group on baseline characteristics expected to influence outcomes using propensity score matching. The comparison group members were selected from King County residents matched on age, gender, race/ethnicity and the following variables, measured in the pre-period: number of Medicaid eligible months, total Medicaid medical costs, in-patient medical costs, long-term care costs, risk score[11], an indicator of alcohol/drug treatment need, receipt of alcohol/drug treatment, presence of serious mental illness, state psychiatric hospital days, alcohol and drug-related arrests, total arrests and homeless months.

For clients included in this evaluation, the index date was either February 1 or March 1, 2009. The index date is the date of randomization to the RTC intervention (i.e., the date KCCP first received client names and payment for services). The one-year pre-intervention period (hereafter the pre-period) is the twelve months prior to the index date. The post-intervention period (hereafter the post-period) includes the index month and up to 14 subsequent months, depending on the availability of data for the outcomes examined. All months with available data (one through 14) are included in the post-period. No data were included for months when clients were no longer eligible for the program (e.g., due to death, loss of financial eligibility, dual status).

Data Source

All data were derived from the state DSHS Research and Data Analysis (RDA) Client Outcomes Database (CODB)[12]. The CODB includes data from the Medicaid Management Information System (MMIS)/Provider One from the Medicaid Purchasing Agency (MPA), the Treatment and Assessment Report Generating Tool (TARGET) from the state Division of Behavioral Health and Recovery (DBHR); outpatient mental health service utilization and inpatient psychiatric service utilization records from the state DBHR; Washington State Patrol (WSP) arrest records; state Department of Health (DOH) death records; and long-term care service utilization from the state Aging and Disability Services Administration (ADSA).

Measures Used in Evaluation

Outcomes: This report focuses on outcomes categorized as medical costs and service use (e.g., total medical expenditures , emergency room, inpatient medical, inpatient psychiatric, long term residential services and in-home long-term care services, and prescription drugs), alcohol and drug treatment services, and other outcomes (i.e., criminal arrests and charges, homelessness, death). Medical costs and service use variables were available through Sept

[11] A medical cost risk score is built on an individual's expected per-member-per-month (PMPM) future expenditures divided by the average PMPM of the individual's medical coverage group. It is expressed as a ratio, with 1.0 equaling the "average" score for the group. A medical risk score of 1.5 would mean that the individual was likely to incur 50 percent more in future medical costs than the average member within the group. For further detail, see Court, B. J., Mancuso, D., Zhu, Ch., & Krupski, A. (in press). Predictive Risk Intelligence System (PRISM): A decision-support tool for coordinating care for complex Medicaid clients. In Schraeder, C. (Ed), Medicaid Care Management Best Practices. New York: John Wiley & Sons, Inc.

[12] Kohlenberg, L. (2009). Integrated client database. Data that improves DSHS decision making and services. Olympia, WA: Washington State Department of Social and Health Services, Research and Data Analysis Division. Report No. 11.144. Also available at: http://www.dshs.wa.gov/pdf/ms/rda/research/11/144.pdf

2009 (i.e., up to 8 months in the post-period). The remaining outcome measures (i.e., alcohol and drug treatment , psychiatric in-patient services, criminal arrests and charges, homelessness, counts of prescriptions and death) were available through March 2010 (i.e., up to 14 months in the post-period). A variable summing total per member per month (PMPM) Medicaid medical costs and total PMPM long term care costs was developed as a measure of total PMPM state payment.

Statistical Analysis

Test statistics (chi-square and t-tests) were used to assess whether the RTC and comparison groups differed at baseline and to summarize unadjusted differences between the RTC and comparison group in the pre- and post-period.

To assess the impact of offering a chronic care management program on health care cost and utilization, we used a difference-in-differences (D-I-D) approach including Time (Post-period=1, Pre-period=0), Group (RTC = 1, Comparison =0) and the interaction of Time by Group. D-I-D estimates represent the difference in outcome from the pre- to the post-period for the treatment group relative to the comparison group. The coefficient estimate for the interaction term of Time by Treatment Group Assignment represents the D-I-D estimate (i.e., the estimate of cost savings or reduction in health care utilization). The D-I-D approach takes into account changes in outcome measures that may occur irrespective of the intervention itself.

Difference-in-differences estimates for continuous outcome measures were estimated with ordinary least squares multivariable regression using data for the full sample, including individuals incurring zero costs or visits.[13] Binary outcome measures, including incurring any expenditure or receiving any service or treatment (yes=1, no=0) were modeled with logistic multivariable regression.

All multivariable models controlled for covariates that could confound associations between the RTC intervention and outcomes including age (in years), race/ethnicity, sex, baseline risk score[14] as a measure of physical and mental health, an indicator of serious mental illness, and an indicator of need for alcohol and drug treatment.

Two observations were used per individual: one for the pre-period and one for the post-period. Robust standard errors were estimated to account for the resulting non-independence of observations.

Because time in the RTC or comparison group varies by individual (due to loss of eligibility or death, or lack of data availability in the post-period), continuous variables are expressed as per member per month (PMPM) for costs and utilization. Additionally, all regression models were

[13] Alternative modeling strategies (generalized linear models, two part models, tobit regression) that address continuous variables that are not normally distributed yielded qualitatively similar results to those obtained with ordinary least squares.

[14] Gilmer, T., Kronick, R., Fishman, P., Ganiats, T. G. (2001). The Medicaid Rx Model. Pharmacy-based risk adjustment for public programs. Medical Care, 39 (11), 1188-1202.

weighted by the number of months in the post-period for which data were available for an individual.

Statistical significance was set at $p \leq 0.05$; findings with p-values ranging from $p > 0.05$ to $p \leq 0.10$ were highlighted as marginally significant.

RESULTS

Comprehensive results (i.e., pre-period, post-period, and difference-in-differences estimates) are summarized in **Appendix B** for all outcome measures.

Sample Characteristics

The RTC and comparison groups were similar at baseline with respect to sex, age, and race/ethnic composition and risk scores (**Table 1**). Approximately half of the members of each group had a serious mental illness.

Of those in the RTC group, 63% started the initial assessment and 51% set at least one care plan goal.

The proportion of individuals with incomplete pre-period data (i.e., < 12 months) was no different between the groups (7% RTC, 9% comparison; p=0.46). Similarly, the proportion with incomplete post-period data through September 2009 and March 2010 did not differ significantly (11% RTC versus 10% comparison, p=0.56 and 18% RTC versus 17% comparison, p=0.46).

In addition, most of the outcome measures did not differ significantly between the groups in the pre-period suggesting a closely matched comparison group **(Appendix B)**. Notable exceptions reaching statistical significance ($p \leq 0.05$) in the pre-period included: a) higher PMPM emergency room costs in the RTC group ($138 versus $104; p=0.05); b) lower counts of anti-depressant prescriptions in the RTC group (0.7 versus 0.9; p=0.04); and c) higher PMPM mean criminal charges in the RTC group (0.04 versus 0.02; p=0.05).

Several measures were also marginally significantly different between the groups in the pre-period ($p > 0.05$ and $p \leq 0.10$): a) a lower proportion with anti-depressant prescriptions in the RTC group (67% versus 73%; =-0.06); and b) higher proportion with arrests (14% versus 10%; p=0.10), criminal charges (14% versus 10%; p=0.09), and felony/gross misdemeanor charges in the RTC group (8% versus 5%; p=0.09).

Table 1. Selected Pre- and Post-Period Measures for RTC and Comparison Groups

	RTC Group N = 390	Comparison Group N = 390	p
PRE-PERIOD	% or Mean (SD) Range	% or Mean (SD) Range	
Age	51 (11) 23 - 85	51 (11) 21 -85	0.76
Male	45	45	1.00
Race/Ethnicity			0.99
White, NH	55	56	
Black, NH	29	28	
Asian	5	4	
AIAN	3	4	
Hispanic	6	6	
Other	2	2	
DxRx Score (Pre-Index mo)[b]	2.5 (1.8) 0.3 - 15.1	2.5 (1.6) 0.1 - 15.2	0.95
SMI	50	48	0.72
Alcohol/Drug Treatment Need	46	44	0.72
Alcohol/Drug Treatment Received	21	22	0.86
Started an Assessment	63	-----	-----
Set at Least One Care Plan Goal	51	-----	-----
Incomplete Pre-Period	7	9	0.46
Eligible Months Pre-Period	12 (1) 5 -12	12 (1) 4 -12	0.88
POST-PERIOD[a]			
Incomplete Post-Period (09_09)	11	10	0.56
Eligible Months Post-Period (09_09)	7 (1) 1-8	7 (1) 1-8	0.93
Incomplete Post-Period (03_10)	18	17	0.71
Eligible Months Post-Period (03_10)	12 (3) 1 - 14	12 (3) 1 – 14	0.96

[a]Medical costs and services use variables were available through Sept 2009 (i.e., up to 8 months in the post-period). The remaining outcome measures (i.e., alcohol and drug treatment , psychiatric in-patient services, criminal arrests and charges, homelessness, counts of prescriptions and death) were available through March 2010 (i.e., up to 14 months in the post-period).

[b] Study eligibility criteria required a DxRX score >1.5. Scores reported here were collected post-randomization and the values in some cases are outside the original study eligibility range.

Intervention Results

Medical Costs and Service Use

The D-I-D estimates were not significantly different from zero for most medical cost and service use measures **(Appendix B).** Specifically, the D-I-D estimates were not statistically significant for any of the following PMPM cost measures: Total Medicaid medical, inpatient, emergency room, long term care (i.e., the sum of assisted living services, adult family care services, adult residential care services, nursing home services), in-home services and prescription drugs. The D-I-D estimate for the sum of Medicaid medical and long term care costs also did not differ significantly for the two groups. The utilization measures (ER visits, inpatient admissions either preceded or not preceded by an ER visit; use and PMPM counts of anti-depressant, anti-psychotic, anti-mania and narcotic prescriptions) were also not significantly different between the groups.

However, average PMPM payments for inpatient psychiatry days spent in state and community hospitals and for inpatient psychiatric stays in community hospitals (excluding State Hospital[15] admissions), both decreased for the RTC group while these average payments increased between the pre- and post-periods for the comparison group (**Table 2)**. The difference in average PMPM payments for the RTC group versus comparison group members was a reduction of approximately $40 PMPM (p<0.10). Only 6 - 7 % of clients in the RTC and comparison groups incurred these costs and there was no statistically significant difference between the groups in the proportion of those who incurred these costs.

Table 2: Psychiatric Costs for Rethinking Care Clients (RTC) and Comparison Group Members (Comparison)

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	p
PMPM Payments for State and Community Hospital Inpatient Psychiatric Days	RTC	$84	$50	-$34	- $42	0.08#
	Comparison	$57	$71	+ $14		
PMPM Payments for Inpatient Psychiatric Stays at Community Hospitals (excludes State Hospital Days)	RTC	$63	$31	-$30	-$40	0.09#
	Comparison	$36	$43	+ $7		

Not statistically significant at p<.05, but indicative of a trend toward significance.
[1] The pre-period represents the 12 months before a client's index month.
[2] The post-period represents the consecutive months following the index month.
[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.
[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.

Alcohol and Drug Treatment

In the RTC group, the proportion of clients incurring payments for alcohol and drug inpatient treatment increased while this proportion declined in the comparison group **(Table 3)**. The odds of incurring any alcohol and drug inpatient treatment payments were more than three-fold higher for the RTC group relative to the comparison group between the pre- and post-periods (p<0.10). Similarly, among clients in the RTC intervention group, average PMPM payments for inpatient alcohol and drug treatment increased while average payments decreased between the pre- and post-periods for the comparison group. The difference in average PMPM costs for the RTC group relative to the comparison group between the pre- and post-periods was $18 higher (p<0.05). There was no significant difference between the groups for the other alcohol and drug treatment variables (use and PMPM costs for outpatient treatment, opiate substitution, assessment, case management and detoxification treatment).

[15] The underlying data for State Hospital costs are estimates derived from the length of stay in days and assuming a fixed cost of $509.77/day.

Table 3: Alcohol and Drug Treatment Payments for All Rethinking Care Clients (RTC) and Comparison Group Members (Comparison)

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	p
% Clients with Any Alcohol and Drug Inpatient Treatment Payments	RTC	3%	4%	+ 1%	3.22[5]	0.06#
	Comparison	3%	2%	- 1%		
Average PMPM Alcohol and Drug Inpatient Treatment Payments	RTC	$6	$11	+$5	$18	0.02*
	Comparison	$16	$4	-$12		

* Statistically significant at p<.05.
# Not statistically significant at p<.05, but indicative of a trend toward significance.
[1] The pre-period represents the 12 months before a client's index month.
[2] The post-period represents the consecutive months following the index month.
[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.
[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.
[5] This estimate reflects the odds of incurring any alcohol and drug inpatient payments for the RTC clients relative to the comparison group members.

Other Outcomes

Criminal Arrests and Charges

In both groups, the proportion of individuals with any arrests or criminal charges declined between the pre- and post-periods; this decline was larger in the RTC group, resulting in lower odds of incurring any arrests or charges (OR=0.54; p<0.10) for the RTC group **(Table 4)**. In the RTC group, the mean PMPM number of criminal charges declined between the pre- and post-periods; whereas, this measure increased in the comparison group, resulting in 0.02 fewer average PMPM charges (p<0.05) for the RTC group in the post-period.

Table 4: Arrests and Charges for All Rethinking Care Clients (RTC) and Comparison Group Members (Comparison Group).

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	p
Any Arrests or Charges	RTC	14%	8%	-6%	0.54	0.06#
	Comparison	10%	9%	-1%		
Average Number PMPM Total Criminal Charges	RTC	0.04	0.03	-0.01	-0.02	0.04*
	Comparison	0.02	0.03	+0.01		

* Statistically significant at p<.05.
# Not statistically significant at p<.05, but indicative of a trend toward significance.
[1] The pre-period represents the 12 months before a client's index month.
[2] The post-period represents the consecutive months following the index month.
[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.
[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.
[5] This estimate reflects the odds of incurring any arrests or charges for the RTC clients relative to the comparison group members.

Homelessness The proportion of clients experiencing homeless (i.e., living in a shelter or outdoors) months or the PMPM mean number of homeless months did not differ significantly between the groups.

Death Three percent of individuals in the RTC group and four percent in the comparison group died during the study period. This difference in proportions was not statistically significant (p= 0.65).

DISCUSSION

This preliminary evaluation of the Rethinking Care (RTC) program was designed to assess the impact of offering a chronic care management program to a targeted population of high-risk Medicaid clients in terms of overall costs, service use, and other health and social service-related outcomes. We compared changes in outcomes for clients offered the RTC intervention to those of clients in a propensity-score matched comparison group. Using an intent-to-treat (ITT) approach, we estimated the effects of offering RTC to the target population, rather than the effects of the program among those who engaged in the intervention. Because many of those offered the RTC intervention did not engage, the evaluation provides conservative "real world" estimates of the treatment effect in the target population that account for the fact that there will always be individuals who do not engage in an available intervention.

Impacts detected through ITT analysis would be compelling evidence that the RTC intervention is effective. However, only a subset of clients randomly assigned to the RTC intervention followed through with the intervention; less than 2/3 started an initial assessment and only 1/2 reached the stage of setting at least one care plan goal. Accordingly, it was not surprising that we found no significant differences in most outcomes between clients in the RTC intervention and those in the comparison group.

The RTC group had lower psychiatric inpatient costs

More surprising were several statistically significant ($p<0.05$) or marginally significant ($p>0.05$ and $p<0.10$) differences in outcomes between the groups. Relative to the comparison group, the group offered RTC services had lower estimated PMPM psychiatric inpatient costs (- $40; p=0.09). While small in magnitude, and marginally significant, this finding represents a trend in the expected direction. With intensive care management, individuals with serious mental illness may receive needed treatment or prescriptions, improve adherence and thus have less expensive community psychiatric hospital admissions when they occur. As there was no difference in the proportion experiencing psychiatric hospitalization overall or in State hospital costs, we attribute this finding to costs associated with community psychiatric hospital admissions.

The RTC group was more likely to receive inpatient alcohol and drug treatment

Clients in the RTC group had three times the odds of receiving inpatient alcohol and drug treatment (OR=3.22; p=0.06) and costs were higher for this group by $18 PMPM. Intensive care management could lead to referral to needed services including inpatient alcohol and drug

treatment. Although these costs are higher for the intervention group in the short run, they could pay future dividends in other improved outcomes in the future (e.g., in decreased criminal activity or improved physical health).

The RTC group had fewer arrests and charges

Another important finding was the reduction in occurrence and amount of arrests and charges in the group offered the RTC intervention. Intensive care management with referral to needed services, including mental health and drug and alcohol treatment could plausibly lead to reduced criminal behavior. Such findings may have important public safety implications and could translate to cost savings in the criminal justice system.

Improved Engagement Rates

As described earlier, only 18% of eligible clients offered the 2007 KCCP pilot intervention initiated an assessment; presumably, fewer completed the assessment. In the design of the RTC intervention, a variety of techniques[16] were systematically employed to improve engagement rate including expert consultation and client outreach efforts by a skilled survey research team. Our findings indicate improvements in client engagement with 63% of the sample initiating an assessment and 51% setting at least one care plan goal.

Strengths and Limitations

Results of this evaluation must be interpreted in light of its strengths and limitations. First, the D-I-D approach adopted for the analysis accounts for changes in the outcomes that occur over time for reasons over and above the intervention itself, for example due to aging, disease progression, or secular trends in treatment and health service delivery. Second, the analysis incorporated weighting by eligible post-member months to account for differences in length of follow-up.

Several important limitations must also be considered. First, the findings may be subject to selection bias. Those who chose to engage in the program may be systematically different from those who do not. In this regard, our intent-to-treat approach provides a conservative estimate of treatment effects. However, with our quasi-experimental design, the RTC group was propensity-score-matched to the comparison group which accounted for many important differences between the groups in the statistical analyses. Even still, there could be non-observable characteristics that we could not account for, that would lead to non-equivalent comparison group. Although considerable work in statistics supports the use of the propensity score method to address selection bias or other threats to randomization, the approach assumes that relevant covariates are captured in the score, and there is no unmeasured confounding.[17,18,19] In our sample, the propensity score method could not create a control

[16] Court, B. (July 28, 2010). Enhanced Client Engagement Project Report. Olympia, WA: Washington State Medicaid Purchasing Administration, Office of Quality and Care Management.
Also see http://www.chcs.org/publications3960/publications_show.htm?doc_id=1261169

[17] Posner MA, Ash AS, Freund KM, Moskowitz MH, Schwartz M. Comparing Standard Regression, Propensity Score Matching, and Instrumental Variables Methods for Determining the Influence of Mammography on Stage of Diagnosis. Health Services & Outcomes Research Methodology. 2001;2:279-290.

[18] D'Agostino R. B., Jr. Propensity score methods for bias reduction in the comparison of a treatment to a non-randomized control group. Stat Med. 1998;17(19):2265-2281.

group that exactly matched the RTC group, so the groups differed on a few of the measured variables in the pre-period.

A second possible limitation is the problem of multiple comparisons. With many outcomes examined, some associations could be statistically significant due to chance.

Third the data are preliminary and, for many observations, data were available for a follow-up period less than one year. As a result, the findings may be influenced by seasonal or other variation in the outcomes (e.g., one-time expenditures due to accidents). It is unknown whether the findings will be robust when the follow-up period is extended. It is also possible that program impacts in this medically high-risk population take longer than one year to emerge.

Fourth, for some of the outcomes (e.g., psychiatric inpatient costs), very few clients incurred these costs; therefore, the findings may not be a true reflection of cost savings or increases in a larger population. For other outcomes (e.g., criminal activity), the RTC group had higher rates of arrest and charges than did the comparison group at baseline; accordingly, improvements in these measures could reflect regression to the mean.

Conclusions and Recommendations

Findings from this analysis suggest that the RTC intervention has a positive impact for several of the programs' expressed goals. Although we focused only on the first eight to fourteen months following randomization to the RTC intervention, our results indicate that the RTC intervention may offer benefits to clients and to the State through reduced psychiatric inpatient costs, increased access to inpatient alcohol and drug treatment and reduced criminal activity. These findings, though preliminary, are encouraging and support continuation of the RTC intervention.

[19] Peikes, D., Moreno, L., & Orzol, S. M. (2008). Propensity score matching: A note of caution for evaluators of social programs. The American Statistician, 62, 222-231.

Appendix A: Criteria for Inclusion in RTC Study

- Enrolled in Medicaid Categorically Needy Aged, Blind, or Disabled coverage at the point of randomization
- Not dually eligible for Medicare at the point of randomization
- Age 21+ at the point of randomization
- Residing in King County at the point of randomization
- The minimum risk threshold is 50% above the average level of risk for this population
- Received at least one service from a provider in the KCCP "network" in the prior 12 months
- At least one "chronic physical" condition identified in the prior 12 months, as measured by the CDPS risk scoring model (see the attached diagnostic (Dx) profile and exclude Psychiatric and Substance Abuse Diagnostic categories)
- An indication of either mental illness (MI) or substance abuse (SA) problems (they could be co-occurring). MI flagged by:
    - MI Dx in MMIS claims or Healthy Options encounters in prior 12 months
    - MI Rx in MMIS claims or Healthy Options encounters in prior 12 months in one of the following classes:
        - Anti-depressant
        - Anti-anxiety
        - Anti-psychotic
        - Anti-mania
    - Received service through the DSHS MHD in prior 12 months:
        - Outpatient Mental Health Treatment through the Regional Support Network (RSN). (The RSN is where the vast majority of DSHS mental health services are provided)
        - Community psychiatric hospitalizations
        - State mental hospital stay
- SA problems flagged by:
    - SA Dx in MMIS claims or Healthy Options encounters in prior 12 months
    - SA Tx or detox in MMIS or TARGET data in prior 12 months
    - SA-related arrest in prior 12 months in Washington State Patrol (WSP) arrest database, including primarily possession, sale, manufacturing of illicit drugs
    - DUI offenses

The following exclusion restrictions were imposed (clients meeting any of these criteria were dropped prior to randomization):

- In skilled nursing facility at point of randomization
- End Stage Renal Disease (ESRD) or HIV/AIDS Dx in prior 12 months
- In Hospice at point of randomization
- Has third-party liability at point of randomization
- Clients with a pregnancy-related diagnosis

Appendix B: Full Sample	PRE - PERIOD			POST - PERIOD				DIFFERENCE-IN-DIFFERENCE ESTIMATE		
	RTC Treatment n = 390	Controls n = 390	p	RTC Treatment n = 390	Controls n = 390	p		Estimate	[95% CI]	p
MEDICAL COSTS AND SERVICE USE										
Total										
% with Any Costs	100	100	1.00	**100**	**94**	**<0.01** **	**OR**	-----	-----	-----
PMPM Medicaid Medical + Long Term Care PMPM , Mean $ (SD)	2,734(3,074)	2,548(2,934)	0.38	**2,895(3,790)**	**2,351(4,476)**	**0.07** *	**$**	156.88	[-253.12, 666.89]	0.55
Median $ (Range)	1,821(15-30,221)	1,485(11-21,712)	-----	1,681(0-35,128)	1,053(0-56,652)	-----		-----	-----	-----
% with Any MAA Costs	100	100	1.00	**97**	**93**	**<0.01**				
PMPM Medicaid Medical costs only, Mean $ (SD)	2,159 (2,687)	1,985 (2,481)	0.35	2,348(3,624)	1,978(4,260)	0.19	**$**	97.74	[-389.36, 584.84]	0.69
Median $ (Range)	1,293 (15 - 26,600)	1,212 (11 - 17,775)	-----	1,060(0-31,471)	839(0-54,694)	-----		-----	-----	-----
Emergency Room										
% with Any Emergency Room Costs	73	71	0.47	53	47	0.12	**OR**	0.96	[0.66, 1.41]	0.85
PMPM Costs, Mean $ (SD)	**138(274)**	**104(187)**	**0.05** **	**120(247)**	**87(210)**	**0.04** **	**$**	-3.91	[-28.96, 21.44]	0.76
Median $ (Range)	0(0-2,083)	0(0-1,700)	-----	0(0-2,211)	0(0-1,957)	-----		-----	-----	-----
% with Any ER Visit	73	71	0.47	53	47	0.12	**OR**	-----	-----	-----
PMPM ER Visits, Mean (SD)	0.37(0.75)	change change	0.18	0.33(0.04)	0.26(0.03)	0.15	**n**	-0.01	[-0.08, 0.06]	0.83
Median (Range)	0(0-9)	0(0-4)	-----	0(0-8)	0(0-5)	-----	**n**	-----	-----	-----
Inpatient Medical										
% with Any Inpatient Medical Costs	43	37	0.13	**28**	**23**	**0.10** *	**OR**	0.94	[0.60, 1.48]	0.79
PMPM Inpatient Medical Costs, Mean $ (SD)	942(2,216)	867(2,009)	0.63	1,099(2,810)	996(3,875)	0.67	**$**	-4.02	[-450, 442]	0.99
Median $ (Range)	0(0-23,451)	0(0-15,138)	-----	0(0-24,231)	0(0-52,693)	-----		-----	-----	-----
% with any IP Admission without ER Visit	15	14	0.68	10	7	0.15	**OR**	-----	-----	-----
PMPM IP Admission (no ER), Mean (SD)	0.02(0.06)	0.02(0.05)	0.58	0.01(0.06)	0.01(0.05)	0.48	**n**	-----	-----	-----
Median (Range)	0(0-1)	0(0-1)	-----	0(0-1)	0(0-1)	-----	**n**	-----	-----	-----
% with any IP Admission with ER Visit	34	31	0.25	**24**	**18**	**0.03** **	**OR**	-----	-----	-----
PMPM IP Admission (with ER), Mean (SD)	0.06(0.12)	0.05(0.12)	0.51	**0.07(0.17)**	**0.05(0.13)**	**0.06** **	**n**	0.01	[-0.01, 0.03]	0.14
Median (Range)	0(0-1)	0(0-1)	-----	0(0-2)	0(0-1)	-----	**n**	-----	-----	-----
Inpatient Psychiatric										
% with Any Community Inpatient Psychiatric (CIP) Costs	7	6	0.55	6	5	0.66	**OR**	0.96	[0.44, 2.07]	0.91
PMPM CIP Costs, Mean (SD)	63(358)	36(174)	0.18	31(179)	43(248)	0.41	**$**	**-40.29**	**[-87.38, 6.79]**	**0.09 ***
Median $ (Range)	0(0-1,773)	0(0-5,258)	-----	0(0-2,484)	0(0-2,704)	-----		-----	-----	-----
Any State Hospital (SH) Admission, %	1	1	0.70	1	0	0.35	**OR**	1.78	[0.18, 17.65]	0.62
PMPM SH Days , Mean (SD)	0.04 (0.54)	0.04(0.63)	0.97	0.06(0.86)	0.01(0.02)	0.18	**n**	0.05	[-0.06, 0.17]	0.32
Median (Range)	0(0-9)	0(0-11)	-----	0(0-16)	0(0-1)	-----	**n**	-----	-----	-----
PMPM Average Cost SH, Mean $ (SD)	21(272)	21(319)	0.97	19(252)	27(320)	0.71	**$**	-1.83	[-4.56, 0.88]	0.19
Median $ (Range)	0(0-4,800)	0(0-5,777)	-----	0(0-4,331)	0(0-4,952)	-----		-----	-----	-----
Any Psychiatric (SH + CIP) Admission, %	7	6	0.67	6	6	0.67	**OR**	1.05	[0.52, 2.12]	0.90
PMPM Average Cost Any Psychiatric Admission, Mean (SD)	84(588)	57(361)	0.45	50(355)	71(425)	0.47	**$**	**-42.13**	**[-89.97, 5.70]**	**0.08 ***
Median $ (Range)	0(0-10,059)	0(0-5,777)	-----	0(0-4,952)	0(0-5,785)	-----		-----	-----	-----
In Home										
% with Any Costs	23	21	0.60	23	20	0.30	**OR**	1.08	[0.89, 1.31]	0.44
PMPM Costs, Mean $ (SD)	315(753)	279(709)	0.48	366(842)	306(748)	0.29	**$**	10.68	[-38.44,59.81]	0.67
Median $ (Range)	0(0-4,639)	0(0-5,376)	-----	0(0-5,240)	0(0-4,819)	-----		-----	-----	-----
Long Term Care										
% with Any Costs	33	29	0.25	29	24	0.14	**OR**	1.01	[0.81, 1.26]	0.93
PMPM Costs, Mean $ (SD)	575(1,135)	562(1,202)	0.87	458(897)	366(790)	0.13	**$**	59.14	[-82.48, 200.77]	0.41
Median $ (Range)	0(0-8,568)	0(0-7,889)	-----	0(0-5,240)	0(0-4,819)	-----		-----	-----	-----
Prescription Drugs										
% with Any Narcotics Costs	71	73	0.52	62	57	0.19	**OR**	1.26	[0.87, 1.82]	0.51
PMPM Narcotics Costs, Mean $ (SD)	28(135)	28(126)	0.95	22(94)	31(238)	0.53	**$**	-9.60	[-24.74, 5.56]	0.21
Median $ (Range)	0(2-1,625)	0(2-2,330)	-----	1 (0 - 1,312)	1 (0 - 4,533)	-----		-----	-----	-----
Narcotics, % with Any Prescription	71	73	0.47	71	69	0.66	**OR**	1.26	[0.87, 1.82]	0.23
Count Prescriptions PMPM, Mean (SD)	0.91 (1.44)	0.90(1.18)	0.84	1.35(2.28)	1.38(1.88)	0.85	**n**	-0.03	[-0.23, 0.18]	0.80
Median (Range)	0(0-11)	0(0-9)	-----	0(0-24)	0(1-12)	-----		-----	-----	-----
Anti-Depressants, % with Any Prescription	**67**	**73**	**0.06 ***	**63**	**70**	**0.03** **	**OR**	1.00	[0.75, 1.33]	0.99
Count Prescriptions PMPM, Mean (SD)	**0.7(0.7)**	**0.9(1.7)**	**0.04** **	**0.5(0.7)**	**0.6(0.7)**	**0.03** **	**n**	0.02	[-0.05, 0.09]	0.64
Median (Range)	0(0-4)	1(0-4)	-----	0(0-4)	1(0-3)	-----	**n**	-----	-----	-----

Anti-Anxiety, % with Any Prescription	26	31	0.20	27	28	0.57		**OR**	1.17	[0.83, 1.63]	0.37	
Count Prescriptions PMPM, Mean (SD)	0.13(0.34)	0.16(0.36)	0.17	0.12(0.32)	0.14(0.34)	0.50		**n**	0.03	[-0.01, 0.06]	0.17	
Median (Range)	0(0-3)	0(0-2)	-----	0(0-2)	0(0-3)	-----		**n**	-----	-----	-----	
Anti-Psychotic, % with Any Prescription	36	37	0.66	34	36	0.61		**OR**	1.01	[0.66, 1.55]	0.96	
Count Prescriptions PMPM, Mean (SD)	0.43(0.95)	0.41(0.76)	0.66	0.35(0.68)	0.37(0.80)	0.66		**n**	0.01	[-0.06, 0.06]	0.94	
Median (Range)	0(0-7)	0(0-4)	-----	0(0-5)	0(0-4)	-----			-----	-----	-----	
Anti-Mania, % with Any Prescription	5	3	0.28	3	3	0.60		**OR**	1.02	[0.54, 1.91]	0.95	
Count Prescriptions PMPM, Mean (SD)	0.04(0.19)	0.02(0.18)	0.37	0.03(0.19)	0.02(0.13)	0.38		**n**	0.01	[-0.01, 0.02]	0.84	
Median (Range)	0(0-2)	0(0-2)	-----	0(0-2)	0(0-2)	-----			-----	-----	-----	
ALCOHOL AND DRUG TREATMENT												
Treatment Need, %	46	44	0.72	-----	-----	-----		-----	-----	-----	-----	
Treatment Engagement, % with Any	21	22	0.86	21	19	0.42		**OR**	1.17	[0.77, 1.78]	0.46	
Treatment Engagement Given Need, % with Any	-----	-----	-----	45	40	0.36		-----	-----	-----	-----	
In Patient, % with Any	3	3	0.53	**4**	**2**	**0.09**	*	**OR**	**3.22**	**[0.95, 10.94]**	**0.06**	**
Cost PMPM, Mean $ (SD)	6(50)	16(120)	0.15	**11(61)**	**4(34)**	**0.07**	*	**$**	**17.75**	**[3.25, 32.25]**	**0.02**	**
Median $(Range)	0(0 - 614)	0(0-1,816)	-----	0(0 - 557)	0(0 - 443)	-----			-----	-----	-----	
Out Patient, % with Any	13	14	0.46	12	12	0.94		**OR**	1.21	[0.71, 2.06]	0.49	
Cost PMPM, Mean $ (SD)	13(57)	13(51)	0.97	9(41)	10(49)	0.75		**$**	0.81	[-4.21, 5.83]	0.75	
Median $(Range)	0 (0 - 633)	0 (0 - 648)	-----	0(0 -575)	0(0 - 451)	-----			-----	-----	-----	
Opiate Substitution, % with Any	9	9	0.90	10	9	0.71		**OR**	1.05	[0.75, 1.46]	0.77	
Cost PMPM, Mean $ (SD)	32(108)	28(99)	0.65	31(104)	25(87)	0.35		**$**	1.98	[-5.42, 9.38}	0.60	
Median $(Range)	0 (0 - 700)	0 (0 - 772)	-----	0(0 - 662)	0(0 - 374)	-----						
Assessment, % with Any	9	9	0.70	9	7	0.32		**OR**	1.58	[0.73, 3.42]	0.24	
Cost PMPM, Mean $ (SD)	1(4)	1(4)	0.84	1(4)	1(7)	0.92		**$**	0.31	[-0.34, 0.96]	0.35	
Median $(Range)	0(0-28)	0(0-19)	-----	0(0-38)	0(0-112)	-----			-----	-----	-----	
Case Management, % with Any	8	9	0.61	8	7	0.65		**OR**	1.28	[0.71, 2.30]	0.42	
Cost PMPM, Mean $ (SD)	1(3)	1(5)	0.64	1(4)	1(6)	0.92		**$**	0.13	[-0.32, 0.59]	0.57	
Median $(Range)	0(0-29)	0(0-94)	-----	0(0-62)	0(0-119)	-----			-----	-----	-----	
Detox Treatment, % with any	5	4	0.50	**5**	**2**	**0.04**	**	**OR**	2.15	[0.72, 6.43]	0.17	
Cost PMPM, Mean $ (SD)	5(25)	3(17)	0.30	**1(34)**	**5(14)**	**0.05**	**	**$**	2.47	[-1.66, 6.61]	0.24	
Median $(Range)	0(0-297)	0(0-170)	-----	0(0-409)	0(0-192)	-----			-----	-----	-----	
OTHER OUTCOMES												
Criminal Arrests and Charges												
Any Arrest, %	**14**	**10**	**0.09**	*	8	9	0.70	**OR**	**0.54**	**[0.28, 1.03]**	**0.06**	*
Arrests PMPM, Mean(SD)	0.02(0.06)	0.01(0.05)	0.13		0.02(0.07)	0.02(0.06)	0.94	**n**	-0.01	[-0.02, -0.001]	0.13	
Median (Range)	0(0-1)	0(0-1)	-----		0(0-1)	0(0-1)	-----	**n**	-----	-----	-----	
Any Charge, %	**14**	**10**	**0.09**	*	8	9	0.70	**OR**	**0.54**	**[0.28, 1.03]**	**0.06**	*
Charges PMPM, Mean (SD)	**0.04(0.14)**	**0.02(0.08)**	**0.05**	**	0.03(0.12)	0.03(0.12)	0.75	**n**	**-0.02**	**[-0.04, -0.001]**	**0.04**	**
Median(Range)	0(0-2)	0(0-1)	-----		0(0-1)	0(0-1)	-----	**n**	-----	-----	-----	
Any Felony or Gross Misdemeanor Charge, %	**8**	**5**	**0.09**	*	5	5	0.87	**OR**	0.60	[0.26, 1.39]	0.23	
Felony/GM Charges PMPM, Mean (SD)	0.01(0.04)	0.01(0.05)	0.49		0.01(0.07)	0.01(0.07)	0.93	**n**	-0.01	[-0.01, 0.01]	0.65	
Median(Range)	0(0-1)	0(0-1)	-----		0(0-1)	0(0-1)	-----	**n**	-----	-----	-----	
Any AOD Arrest, %	4	3	0.44		2	2	1.00	**OR**	0.77	[0.22, 2.71]	0.68	
AOD Arrests PMPM, Mean (SD)	0.01(0.02)	0.01(0.03)	0.87		0.01(0.04)	0.01(0.05)	0.81	**n**	-0.01	[-0.01, 0.01]	0.64	
Median(Range)	0(0-1)	0(0-1)	-----		0(0-1)	0(0-1)	-----	**n**	-----	-----	-----	
Homelessness												
Any Homeless Months, %	14	12	0.52		11	9	0.57	**OR**	1.10	[0.70, 1.72]	0.68	
Homeless Months PMPM, Mean (SD)	0.09(0.27)	0.07(0.24)	0.37		0.07(0.24)	0.06(0.22)	0.53	**n**	-0.01	[-0.03, 0.02]	0.62	
Median(Range)	0(0-1)	0(0-1)	-----		0(0-1)	0(0-1)		**n**	-----	-----	-----	

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention

[b]All multivariable models controlled for group assignment, time (pre- versus post), Dx-Rx score as a measure of condition severity, age, race/ethnicity, sex, an indicator of serious mental illness, an indicator of alcohol and drug treatment need and were weighted by the number of months of eligibility.

[c]Outcomes were estimated with ordinary least squares regression in the full sample including those with zero expenditures, visits, arrests, prescriptions etc.. Alternative modeling strategies (generalized linear models, two part models, tobit regression) accounting for the skewed distribution yielded similar results.

[d]Abbreviations: PMPM = per member per month; OR = odds ratio; CI=Confidence interval

[e] Any psychiatric admission is a roll up of state hospital and community psychiatric hospital admissions; Costs for this variable assume a fixed cost of $509.77/day for State Hospital Admissions

Appendix C
Exploratory Analysis in Two Subgroups of Clients who Received RTC Intervention[20]

This exploratory analysis aims to estimate the impact of the RTC chronic care management intervention on outcomes of two non-mutually exclusive subgroups of individuals randomized to receive the RTC intervention:

1. **Assessment Date Group** (i.e., those who initially agreed to participate in the intervention). For this group, the index date of the RTC intervention was redefined from the date of randomization to the date of the client initiating the intake assessment (n = 245). A propensity score-matched comparison was selected from the "wait list" group (n = 245).

2. **Care Plan Date Analysis Group** (i.e., those who followed through with the intervention to set at least one care plan goal). For this group, the index date of the intervention was redefined from the date of randomization to the date of the client setting the first care plan goal (n = 199). A propensity score-matched comparison group was selected from the "wait list" group (n = 199).[21]

The Assessment Date analysis includes clients who at least started with the RTC intervention process; whereas, the Care Plan Date analysis includes clients who stayed with the program longer and engaged with the program long enough to set a care plan goal. By excluding individuals who did not initiate the intervention, these analytic approaches estimate the treatment effect for those were involved with the RTC program at two progressively deeper levels. Results can identify potential dose-response effects that might support a causal relationship between the intervention and observed outcomes.

The analyses for these two groups are regarded as exploratory because the post period was severely attenuated (relative to the post period available for the ITT analysis summarized in the body of the report) due to clients not engaging in the intervention for months and, in some cases, a year or more, after they were randomized. Take, for example, analyses related to expenditures which had a maximum post period of 8 months. In this case, 90% of clients included in the ITT analyses had complete post data compared to 65% of clients included in the assessment date analysis and 59% included in the care plan analysis.

Missing information was even more pronounced for the non-expenditure measures which had a maximum post period of 14 months. In this case, 82% of clients in the ITT group had complete post data compared to 20% in the Assessment Date group and 17% in the care plan date group.

[20] Comprehensive results from the Assessment Date and Care Plan Date Analyses are summarized in **Appendix D** and **Appendix E**, respectively.
[21] Gilmer, T., Kronick, R., Fishman, P., Ganiats, T. G. (2001). The Medicaid Rx Model. Pharmacy-based risk adjustment for public programs. Medical Care, 39 (11), 1188-1202.

Despite this missing information, we felt it was useful to conduct exploratory analyses. At the same time, we recognize the limitations of these analyses and, for this reason, include them only in the appendix and not in the body of the report.

Methods

For both analyses, the methods were similar to those presented in the body of this report. PMPM measures for costs and utilization were used to account for variation in time in the intervention across participants. All D-I-D regression models were weighted by the number of eligible post-intervention member months. The multivariable models were adjusted for covariates that could confound relations between treatment and outcomes including age (measured in years), race/ethnicity, sex, baseline risk score as a measure of physical and mental health, an indicator of serious mental illness, and an indicator of need for alcohol and drug treatment. Robust standard errors were used to account for non-independence of the observations. Statistical significance was set at $p \leq 0.05$; findings with p-values ranging from $p > 0.05$ to $p \leq 0.10$ were highlighted as marginally significant.

Results

To assess the extent to which clients who continued with the RTC program past the date of randomization differed from those who were assigned but did not participate, selected pre- and post-period variables were compared for three mutually exclusive groups: 1) those randomly assigned to the program who did not initiate an assessment (Group 1; n = 145), 2) those who initiated an assessment but did not set a care plan goal (Group 2; n = 46), 3) those who initiated an assessment and set at least one care plan goal (Group 3; n=199).

There were no differences between the groups for most variables examined **(Table C-1);** most of the significant differences related to number of eligible months in the pre- and post-periods. Group 3 relative to Group 1 had fewer deaths, fewer arrests and a greater proportion with incomplete post-period months for outcomes measured through Sept, 2009. Group 2 relative to Group 3 had fewer eligible months in the pre-period. Group 2 also had fewer eligible post-period months for outcomes measured through March 2010, relative to Group 3 and to Group 1. Finally the three groups differed significantly from one another with regard to the proportion with incomplete pre-period months (9% Group 1, 23% Group 2, 3% Group 3), the proportion with incomplete post-period months for outcomes measured through March 2010 (34% Group 1, 61 Group 2, 84 Group 3) and the number of eligible months in the post-period for outcomes measured through March 2010 (10.8 - Group 1, 7.7 - Group 2, 8.0 - Group 3).

Table C-1: Comparison of Selected Characteristics RTC Clients with Increasing Levels of Program Engagement

	Group 1 No Assessment No Care Plan Goal N = 145	Group 2 Initiated Assessment Set No Care Plan Goal N = 46	Group 3 Completed Assessment Set ≥ 1 Care Plan Goal N = 199	p[a]
PRE-PERIOD	% or Mean (SD)	% or Mean (SD)	% or Mean (SD)	
Age 65 or older	8	7	3	
Male	54	43	39	
Race/Ethnicity				
White, NH	60	54	57	
Black, NH	26	33	30	
Asian	3	2	6	
AIAN	3	2	4	
Hispanic	7	7	0	
Other	1	2	3	
DxRx Score (Pre-Index mo)	2.6 (1.8)	(2.2) 2.0	2.4 (1.5)	
Alcohol/Drug Treatment Need	48	48	41	
SMI	48	48	47	
Alcohol/Drug Treatment Received	22	28	23	
Death During Study	8[c]	2	1[c]	
Incomplete Pre-Period	9[b,c]	24[b,d]	3[c,d]	
Eligible Months Pre-Period	11.8 (0.9)	11.6 (0.8)[d]	11.9(0.5)[d]	
Total MAA Medical Costs PMPM	2,386 (2,901)	2,460 (5,588)	2,025 (2,469)	
Homeless Months PMPM	.13 (.32)	.06 (.22)	.07 (.24)	
Long Term Care Costs PMPM	637 (1,406)	560 (1,116)	597 (930)	
Number of Arrests PMPM	.03 (.09)[c]	.01 (.04)	.01 (.04)[c]	
POST-PERIOD[e]				
Incomplete Post-Period (09_09)	29[c]	39	47[c]	
Eligible Months Post-Period (09_09)	6.6(1.9)[b,c]	4.1(2.4)[b,d]	4.6(2.1)[c,d]	
Incomplete Post-Period (03_10)	34[b,c]	61[b,d]	84[c,d]	
Eligible Months Post-Period (03_10)	10.8(4.1)[b,c]	7.7(4.0)[b]	8.0(3.7)[c]	

[a] Associations not significant unless noted. All p-values adjusted for multiple comparisons with the Bonferroni correction; [b] Association significant (p<0.05) for Groups 1 and 2; [c] for Groups 1 and 3; [d] for Groups 2 and 3

[ea]Medical costs and services use variables were available through Sept 2009 (i.e., up to 8 months in the post-period). The remaining outcome measures (i.e., alcohol and drug treatment , psychiatric in-patient services, criminal arrests and charges, homelessness, counts of prescriptions and death) were available through March 2010 (i.e., up to 14 months in the post-period).

Assessment Date Analysis
Comprehensive results for all outcomes examined for the Assessment Date analysis are summarized in **Appendix D,** which includes the matching variables and their means or proportions across the intervention and matched comparison groups.

Demographic and Background Characteristics at Baseline
After matching for the Assessment Date Analysis, the RTC and comparison groups were similar at baseline by sex, age, and race/ethnic composition and risk scores **(Table C-2)**. Approximately 47% in the RTC group and 48% in the comparison group were categorized as having serious mental illness (p=0.86). By design, 100% of clients in the RTC group had started the initial assessment; 81% had progressed to set at least one care plan goal. The proportion of individuals with incomplete pre-period data (i.e., < 12 months) was no different between the groups (7% RTC, 7% comparison; p=0.86). Similarly, the proportion with incomplete post-period data did not differ significantly (45% RTC versus 46% comparison, p = 0.86 for outcomes measured through Sept 2009; and 80% RTC versus 73% comparison, p=0.11 for outcomes measured through March 2010). Notably, for all outcomes examined, a large proportion of observations in both groups had incomplete follow up data available.

Inpatient PMPM psychiatric costs were higher for the RTC group relative to comparison group members in the pre-period ($43 versus $14; p=0.07, **Appendix D**). Several other variables were marginally significantly different between the groups at baseline ($p>0.05$ and $p\leq0.10$): a) higher PMPM inpatient psychiatric costs in the RTC group ($40 versus $14); b) higher proportion of clients with long term care residential costs in the RTC group (37% versus 30%); c) lower proportion of clients with anti-anxiety prescriptions in the RTC group (25% versus 32%); d) fewer PMPM anti-anxiety prescriptions in the RTC group (0.01 versus 0.04); e) higher proportion of clients with any arrest (10% versus 5%), criminal charge (10% versus 5%) or felony/gross misdemeanor charge in the RTC group (7% versus 3%).

Table C-2: Assessment Date Analysis
Selected Pre- and Post-Period Measures for RTC and Comparison Groups

	RTC Group N = 245	Comparison Group N = 245	p
PRE-PERIOD	% or Mean (SD) Range	% or Mean (SD) Range	
Age	50 (10) 23 - 85	51 (11) 23 -84	0.70
Male	40	40	1.00
Race/Ethnicity			0.65
White, NH	52	53	
Black, NH	31	30	
Asian	5	5	
AIAN	4	3	
Hispanic	6	8	
Other	2	1	
DxRx Score (Pre-Index mo)	2 (2) 0 - 14	2 (1)0 - 11	0.82
SMI	47	48	0.86
Started an Assessment	100	-----	-----
Set at Least One Care Plan Goal	81	-----	-----
Incomplete Pre-Period	7	7	0.86
Eligible Months Pre-Period	12 (.6) 7 -12	12 (.5) 8 -12	0.61
POST-PERIOD[a]			
Incomplete Post-Period (09_09)	45	46	0.86
Eligible Months Post-Period (09_09)	5 (2) 1-8	5 (2) 1-8	0.80
Incomplete Post-Period (03_10)	80	73	0.11
Eligible Months Post-Period (03_10)	8 (4) 1 - 14	8 (4) 1 - 14	0.22

[a]Medical costs and services use variables were available through Sept 2009 (i.e., up to 8 months in the post-period). The remaining outcome measures (i.e., alcohol and drug treatment , psychiatric in-patient services, criminal arrests and charges, homelessness, counts of prescriptions and death) were available through March 2010 (i.e., up to 14 months in the post-period).

Medical Costs and Service Use

There were no significant differences for most medical cost and service use variables examined for the RTC versus comparison group **(Appendix D).** Specifically, the D-I-D estimates were not statistically significant for any of the following PMPM variables between the RTC and comparison group: Total PMPM Medicaid medical costs, total PMPM inpatient medical costs, total PMPM emergency room costs, total PMPM in-home costs, and total PMPM narcotics costs. A variable summing total PMPM Medicaid medical costs and total PMPM LTC costs was developed as a measure of total PMPM state payments. This D-I-D estimate also did not differ for the groups.

In both groups, total PMPM long term care costs (the sum of costs for assisted living services, adult family care services, adult residential care services and nursing home services) were higher in the pre-period than in the post-period; however, the decline was greater for the comparison group members resulting in a D-I-D estimate that was $260 higher for the RTC group **(Table C-3)**.

The PMPM count of prescriptions for anti-anxiety medication declined in both groups between the pre- and post-periods. The decline was greater in the control group, resulting in 0.07 more

prescriptions PMPM for the RTC group (p<0.01; results not shown in table). None of the other prescription drug variables differed between the groups.

Table C-3: Medical Costs and Service Use for Rethinking Care Clients (RTC) Who Had a RTC Assessment and Comparison Group Members Comparison Group).

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	p
PMPM Payments for Long Term residential Care (i.e., Nursing Home Care)	RTC Comparison	$565 $566	$377 $255	- $188 - $311	$260	0.02*

* Statistically significant at p<.05.
[1] The pre-period represents the 12 months before a client's index month.
[2] The post-period represents the consecutive months following the index month.
[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.
[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.

Alcohol and Drug Treatment

In the RTC group, PMPM payments for inpatient alcohol and drug treatment the proportion of clients incurring alcohol and drug inpatient treatment increased while the same outcome increased among comparison group members **(Table C-4)**, for a difference in PMPM costs for the RTC group $9 higher than in the comparison group. Very few individuals (<10 in either group) received these services and the p-value for the D-I-D estimate was only marginally significant (p=0.09) so this finding should be interpreted with caution.

Table C-4: Alcohol and Drug Treatment Payments for Rethinking Care Clients (RTC) Who Had a RTC Assessment and Comparison Group Members (Comparison Group).

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	P
Average PMPM Alcohol and Drug Inpatient Payments	RTC Comparison	$5 $6	$8 $1	+$3 -$5	$9	0.09[#]

Not statistically significant at p<.05, but indicative of a trend toward significance.
[1] The pre-period represents the 12 months before a client's index month.
[2] The post-period represents the consecutive months following the index month.
[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.
[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.

Other Outcomes (Table C-5)

Arrests and Charges

In the RTC group, the proportion of individuals with arrests or charges declined while this proportion increased in the comparison group between the pre- and post-periods resulting in lower odds of incurring arrests or charges (OR=0.23; p=0.02) for the RTC versus comparison groups. Similarly, in both groups the proportion with any felony or gross misdemeanor charges declined between the pre- and post-periods in the RTC group and increased in the comparison group resulting in lower odds for the RTC versus comparison groups (OR= 0.12; p=0.05).

Homelessness

In both groups, the proportion experiencing any homeless (i.e., living in a shelter or outdoors) months declined; however this decline was greater in the intervention group. At follow-up, the RTC group was marginally less likely (OR = 0.55; p = 0.06) to experience homeless months relative to comparison group members.

Death

One percent of individuals in the RTC group and two percent in the comparison group died during the post-period. This difference in proportions was not statistically significant (p= 0.41).

Table C-5: Other Outcomes Rethinking Care Clients (RTC) Who Had a RTC Assessment and Comparison Group Members (Comparison Group)

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	P
Any Arrests or Charges	RTC Comparison	10% 5%	3% 7%	-7% +2%	0.23[5]	0.02*
Any Felony or Gross Misdemeanor Charges	RTC Comparison	7% 3%	1% 4%	-6% +1%	0.12[6]	0.05*
Any Homeless Months	RTC Comparison	11% 11%	7% 10%	-4% -1%	0.55[7]	0.06[#]

* Statistically significant at p<.05.

[1] The pre-period represents the 12 months before a client's index month.

[2] The post-period represents the consecutive months following the index month.

[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.

[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.

[5] This estimate reflects the odds of incurring any arrests or charges for the RTC clients relative to the comparison group members.

[6] This estimate reflects the odds of incurring any felony or gross misdemeanor charge for the RTC clients relative to the comparison group members.

[7] This estimate reflects the odds of experiencing any homeless months **(i.e. , living in a shelter or outdoors)** for the RTC clients relative to the comparison group members.

Care Plan Date Analysis

Comprehensive results for all outcomes examined for the Assessment Date analysis are summarized in **Appendix E,** which includes the matching variables and their means or proportions across the intervention and matched comparison groups.

Demographic and Background Characteristics at Baseline (Table C-6)

After matching for the Care Plan Date Analysis, the RTC and comparison groups were similar at baseline by sex, age, and race/ethnic composition. The groups were also similar with respect to their risk scores. Approximately 47% in the RTC group and 45% in the comparison group were categorized as having serious mental illness (p=0.63). By design, 100% of clients in the RTC group had completed the initial assessment and had set at least one care plan goal.

Table C-6: Care Plan Date Analysis
Selected Pre- and Post-Period Measures for RTC and Comparison Groups

	RTC Group N = 199	Comparison Group N = 199	p
PRE-PERIOD	% or Mean (SD) Range	% or Mean (SD) Range	
Age	**51 (10)23-84**	**50(10)23-72**	0.76
Male	37	37	1.00
Race/Ethnicity			0.97
White, NH	50	51	
Black, NH	30	32	
Asian	6	6	
AIAN	4	3	
Hispanic	7	5	
Other	3	3	
DxRx Score (Pre-Index mo)	2 (1.5)0.5 - 14	2(1.3)0.4 -7	0.51
SMI	47	45	.67
Started an Assessment	100	-----	-----
Set at Least One Care Plan Goal	100	-----	-----
Death during Post-Study Period	1	2	0.18
Incomplete Pre-Period	4	5	0.46
Eligible Months Pre-Period	12 (.5) 7 -12	12 (.4) 8 -12	0.92
POST-PERIOD			
Incomplete Post-Period (09_09)	41	45	0.48
Eligible Months Post-Period (09_09)	5 (2) 1-8	5 (2) 1-8	0.52
Incomplete Post-Period (03_10)	83	76	0.08
Eligible Months Post-Period (03_10)	8 (4) 1 - 14	8 (4) 1 - 14	0.81

In the Care Plan Date analysis, only two variables were statistically significantly different (p<0.05) between the RTC and comparison groups in the pre-period a) higher proportion incurring any long term care costs in the RTC group (37% versus 29%) and; b) lower proportion of clients with anti-anxiety prescriptions in the RTC group (25% versus 29%) **(Appendix E)**

Medical Costs and Service Use (Table C-7)

In the Care Plan Date analysis, most medical cost and service use outcomes did not differ for the RTC and comparison groups **(Appendix E)**. PMPM Total Medicaid Medical costs declined in both groups but the decline was greater in the intervention group for a marginally significant (p=0.06) difference of $775 lower for the RTC group. In both groups, the proportion incurring inpatient costs declined; however the proportion at both time points was greater in the comparison group. Accordingly, at follow-up the RTC group members had marginally significantly lower odds of incurring inpatient costs (OR=0.48; p=0.09) relative to the comparison group. PMPM average inpatient costs were significantly lower by -$700 for the RTC group. Long term residential care PMPM costs decreased in both groups between the two time periods, with the treatment group sustaining a larger decrease. The difference was marginally significantly higher ($189; p=0.08) for the RTC group.

Table C-7: Medical Costs and Service Use for Rethinking Care Clients (RTC) Who Established a Care Plan Goal and Comparison Group Members (Comparison Group).

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	P
Average PMPM Total Medicaid Medical Costs	RTC Comparison	$2,050 $1,847	$1,131 $1,361	- $1,919 -$486	-$775	0.06#
% Clients with Any Inpatient Medical Costs	RTC Comparison	33% 37%	11% 14%	- 22% - 23%	0.48[5]	0.09#
Average PMPM Inpatient Medical Costs	RTC Comparison	$802 $671	$369 $649	- $433 - $22	-$700	0.05*
Average PMPM Long Term Care residential Costs[6]	RTC Comparison	$568 $553	$355 $292	- $213 - $261	$189	0.08#

* Statistically significant at p<.05.

Not statistically significant at p<.05, but indicative of a trend toward significance.

[1] The pre-period represents the 12 months before a client's index month.

[2] The post-period represents the consecutive months following the index month.

[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.

[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.

[5] This estimate reflects the odds of incurring any inpatient expenditures for the RTC clients relative to the comparison group members.

[6] Long Term Care Costs include the sum of assisted living services, adult family care services, adult residential care services and nursing home services.

The utilization measures (ER visits and Inpatient admissions, either preceded or not preceded by an ER visit) were not significantly different between the groups **(Appendix E)**. Similarly, there were no significant differences in use of psychiatric inpatient services or PMPM payments for these services with or without State Hospital stays between the groups. Finally, there were no statistically significant differences between the groups in the PMPM count of prescriptions for any of the medication types examined.

Alcohol and Drug Treatment (Table C-8)

Opiate substitution treatment costs declined in both groups; however, the RTC group had slightly higher costs at baseline and a smaller decline over time for a difference of $11 higher PMPM costs for the RTC group. Average PMPM payments for alcohol and drug assessment, while low, declined in the comparison group and remained stable in the treatment group, for marginally significantly higher costs in the RTC group ($0.80; p=0.07; result not shown in table).

Table C-8: Alcohol and Drug Treatment Payments for Rethinking Care Clients (RTC) Who Established a Care Plan Goal and Comparison Group Members (Comparison Group).

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	P
Average PMPM Opiate Substitution Treatment Costs	RTC	$36	$34	-$2	$11	0.07[#]
	Comparison	$34	$25	- $9%		

Not statistically significant at p<.05, but indicative of a trend toward significance.
[1] The pre-period represents the 12 months before a client's index month.
[2] The post-period represents the consecutive months following the index month.
[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.
[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.
[5] This estimate reflects the odds of incurring any opiate substitution payments for the RTC clients relative to the comparison group members.

Other Outcomes (Table C-9)

Arrests and Charges There were no statistically significant differences between the groups in the proportion of individuals incurring any arrests, charges or felony/gross misdemeanor charges. The average PMPM number of total charges increased in both groups; however the increase was greater in the comparison group for marginally significantly lower charges in the RTC group (-0.02; p=0.08 The average PMPM number of felony/gross misdemeanor charges remained the same in the RTC group and increased slightly in the comparison group for marginally significantly lower charges in the RTC group (-0.01; p=0.10).

Homelessness

The proportion of clients experiencing homeless (i.e., living in a shelter or outdoors) months or the PMPM mean number of homeless months did not differ significantly between the groups.

Death

One percent of individuals in the RTC group and two percent in the comparison group died during the study period. This difference in proportions was not statistically significant (p= 0.18).

Table C-9: Other Outcomes for Rethinking Care Clients (RTC) Who Established a Care Plan Goal and Comparison Group Members (Comparison Group).

Variable	Group	Pre-Period[1] Average	Post-Period[2] Average	Difference[3]	Difference-in-Difference Estimate[4]	P
Average PMPM Total Criminal Charges	RTC	0.01	0.02	+0.01	-0.02	0.08#
	Comparison	0.01	0.04	+0.03		
Average PMPM Felony or Gross Misdemeanor Charges	RTC	0.01	0.01	0.00	-0.01	0.10#
	Comparison	0.01	0.02	+0.01		

Not statistically significant at p<.05, but indicative of a trend toward significance.
[1] The pre-period represents the 12 months before a client's index month.
[2] The post-period represents the consecutive months following the index month.
[3] A positive difference indicates that the outcome increased in the post-period compared to the pre-period; a negative difference indicates that it decreased.
[4] Models included indicators of group assignment, time (pre- versus post), risk score (as a measure of condition severity), age, race/ethnicity, sex, serious mental illness, alcohol and drug treatment need and were weighted by the number of months of eligibility during the period of interest.

Discussion

Some of the reported findings were not consistent across the Assessment Date and Care Plan Date analyses, nor were they fully consistent with those from the analysis of the full sample randomized to treatment. There are at least two plausible explanations for the inconsistencies. First, the findings are preliminary and a large proportion of individuals who progressed to assessment or care plan goal setting had incomplete data available for the post-periods. Second, selection bias may play role given the absence of true randomization. Individuals who engaged with the RTC intervention may be systematically different than the comparison group members on unobserved variables that also influence the outcomes we examined. A previous report documented systematic differences between clients who started an RTC assessment and those who did not: those who started an assessment were more likely to be female, receive home-based ADSA services, and receive prescription medications for specific chronic diseases.[22]

The findings of lower psychiatric inpatient costs from the analysis in the full sample were not were robust in the Assessment Date and Care Plan Date analyses, suggesting that these could be selection effects rather than true treatment effects. In other words, it appears as if these findings were driven by changes among those individuals who were randomized to the intervention but did not progress to set a care plan goal.

Findings of reduced arrests and criminal charges were the most consistent across the three analyses, lending some credence to these findings as possible treatment effects. Most encouraging was the reduction in the odds of serious crime in the Assessment Date analysis and in the PMPM average number of these crimes in the Care Plan Date analysis. One possible

[22] Imara I. West, MPH, Jutta M. Joesch, PhD, David Atkins, PhD, Toni Krupski, PhD, Meg Cristofalo, MSW, MPA, Lindsay Jenkins, MPA, MPH, and Peter Roy-Byrne, MD. June 30 2010. Clients Assigned to the Rethinking Care Program Intervention: How Do Clients Who Started an Assessment Differ from Those Who Did Not?

and the Assessment Date sample indicated higher proportions of these variables in the RTC group at baseline. This explanation is not supported, however, in the Care Plan Date analysis where no difference was found in the baseline variables across groups whereas the reductions remained statistically significant.

The higher PMPM costs for Alcohol and Drug treatment in the RTC group were also somewhat consistent across the three analyses. Such results are expected with increased access to alcohol and drug treatment through intensive care management. However, while the trend was generally toward higher costs in the RTC group, the specific variables that reached statistical significance differed somewhat in each analysis.

Both the Assessment Date and Care Plan Date analyses indicated higher costs for long term care (i.e., assisted living services, adult family care services, adult residential care services, and nursing home services) in the RTC group PMPM enrolled. There was no difference in in-home costs between the groups. Higher LTC costs could reflect unmet need addressed by the intervention or sample selection bias. Given our summary measure, it is not possible to conclude which component of LTC costs is driving the increase.

Two findings, the reductions in total PMPM homeless months and the increase in the average PMPM anti-anxiety prescriptions in the RTC group, were particular only to the Assessment Date analysis. We cannot conclude with confidence that these are true treatment effects as selection bias may underlie these findings.

In the Care Plan Date analysis, the index date of the intervention was redefined from the date of randomization to the date of the client setting the first care plan goal. This analysis was designed to detect the impacts of the intervention, if such impacts exist, by capturing increasing engagement with the RTC program. With the caveats and limitations outlined previously, some of the findings from the Care Plan Date analysis were in the expected direction and may reflect treatment effects. We found medical cost savings (-$774 PMPM; p=0.06) driven almost entirely by a reduction in the occurrence of in-patient admissions (OR=-.48; p=0.09) and lower in-patient costs when incurred (-$700 PMPM; p=0.05). Our interim analysis was unable to determine whether or not the cost savings were attributable to admissions with ED activity. We recommend that future analysis focus on this distinction and on better understanding the characteristics of individuals who proceeded with the program to the point of establishing a care plan goal.

Results of these exploratory analyses cannot be generalized to the entire RTC population as they are based on select subgroups of the individuals randomized to receive the intervention. Even still, the results support continued focus on strategies that have proven to be successful in promoting and sustaining client engagement with RTC[23] given the suggestion that benefits may accrue among those who engage with the program.

[23] Court, B. Enhanced Client Engagement Project Report. July 28, 2010. Washington State Medicaid Purchasing Administration, Office of Quality and Care Management. Reference ID #100568.

Appendix D: Assessment Date Analysis	PRE - PERIOD			POST - PERIOD				DIFFERENCE-IN-DIFFERENCE ESTIMATE		
	RTC Treatment n = 245	Controls n = 245	p	RTC Treatment n = 245	Controls n = 245			Estimate	[95% CI]	p
MEDICAL COSTS AND SERVICE USE										
Total										
% with Any Costs	100	100	0.32	60	61	0.64	**OR**	-----	-----	-----
PMPM Medicaid Medical + Long Term Care , Mean $ (SD)	2,672(3,552)	2,651(3,225)	0.95	1,702(3,750)	1,547(4,086)	0.66	**$**	119.98	[-642.37, 882.32]	0.76
Median $ (Range)	1,759(10-40,728)	1,546(0-23,147)	-----	595(0-45,900)	473(0-48,246)	-----	-----	-----	-----	-----
% with Any MAA Costs	100	100	0.32	60	61	0.64				
PMPM Medicaid Medical costs only, Mean $ (SD)	2,106(3,276)	2,085(2,864)	0.94	1,325(3,429)	1,293(3,771)	0.92	**$**	-139.71	[-676.79, 568.29]	0.71
Median $ (Range)	1,108(10-36,686)	1,101(0-20,854)	-----	419(0-43,554)	380(0-43,938)	-----	-----	-----	-----	-----
Emergency Room										
% with Any Costs	65	69	0.39	25	26	0.92	**OR**	1.11	[0.63, 1.97]	0.72
PMPM Costs, Mean $ (SD)	127(309)	100(200)	0.25	80(269)	77(294)	0.91	**$**	-22.93	[-77.42, 31.56]	0.41
Median $ (Range)	34(0-2,393)	33(0-1,457)	-----	0(0-2,525)	0(0-2,462)	-----	-----	-----	-----	-----
% with Any ER Visit	65	69	0.34	25	26	0.84	**OR**	-----	collinearity	-----
PMPM ER Visits, Mean (SD)	0(0-8)	0(0-4)	0.21	0(0-8)	0(0-4)	0.57	**n**	-0.02	[-0.16, 0.13]	0.83
Median (Range)	0.35(0.88)	0.27(0.52)	-----	0.22(0.84)	0.18(0.55)	-----	-----	-----	-----	-----
Inpatient Medical										
% with Any Costs	36	36	0.93	11	12	0.89	**OR**	0.81	[0.36, 1.78]	0.60
PMPM Costs, Mean $ (SD)	881(2,616)	907(2,266)	0.91	557(2,768)	568(3,191)	0.97	**$**	-111.17	[-745.32, 522.99]	0.73
Median $ (Range)	0(0-30,816)	0(0-17,568)	-----	0(0-36,662)	0(0-40,418)	-----	-----	-----	-----	-----
% with any IP Admission without ER Visit	10	14	0.21	5	4	0.50	**OR**	-----	collinearity	-----
PMPM IP Admission (no ER), Mean (SD)	0.01(0.04)	0.01(0.04)	0.37	0.01(0.07)	0.01(0.06)	0.70	**n**	0.01	[-0.01, 0.02]	0.30
Median (Range)	0(0-0.17)	0(0-0.25)	-----	0(0-1)	0(0-1)	-----	-----	-----	-----	-----
% with any IP Admission with ER Visit	31	29	0.62	9	10	0.76	**OR**	-----	collinearity	-----
PMPM IP Admission (with ER), Mean (SD)	0.06(0.14)	0.04(0.09)	0.26	0.04(0.14)	0.03(0.14)	0.86	**n**	-0.01	[-0.05, 0.02]	0.38
Median (Range)	0(0-2)	0(0-1)	-----	0(0-1)	0(0-1)	-----	-----	-----	-----	
Inpatient Psychiatric										
% with Any Community Inpatient Psychiatric (CIP) Costs	5	3	0.27	5	3	0.24	**OR**	1.17	[0.31, 4.40]	0.82
PMPM CIP Costs, Mean (SD)	**40(208)**	**14(86)**	**0.07**	24(118)	49(426)	0.38	**$**	-39.67	[-90.83, 11.48]	0.13
Median $ (Range)	0(0-1,820)	0(0-862)	-----	0(0-898)	0(0-5,740)	-----	-----	-----	-----	-----
Any State Hospital (SH) Admission, %	0	0	0.32	0	0	0.32	**OR**	-----	too few observations	-----
PMPM SH Days , Mean (SD)	-----	-----	-----	-----	-----	-----	**n**	-----	-----	-----
Median (Range)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PMPM Average Cost SH, Mean $ (SD)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Median $ (Range)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Any Psychiatric (SH + CIP) Admission, %	6	3	0.19	**5**	**2**	**0.10**	**OR**	1.16	[0.31, 4.27]	0.82
PMPM Average Cost Any Psychiatric Admission, Mean (SD)	**43(211)**	**14(86)**	**0.05**	27(131)	49(426)	0.46	**$**	-37.96	[-89.22, 13.30]	0.15
Median $ (Range)	0(0-1,820)	0(0-862)	-----	0(0-898)	0(0-5,740)	-----	-----	-----	-----	-----
In Home										
% with Any Costs	28	22	0.12	**20**	**13**	**0.05**	**OR**	1.23	[0.83, 1.81]	0.31
PMPM Costs, Mean $ (SD)	420(850)	336(812)	0.26	315(777)	231(670)	0.20	**$**	77.03	[-85.96, 240.02]	0.35
Median $ (Range)	0(0-4,660)	0(0-5301)	-----	0(0-4,684)	0(0-4,308)	-----	-----	-----	-----	-----
Long Term Care										
% with Any Costs	**37**	**30**	**0.10 ***	**23**	**15**	**0.02 ****	**OR**	1.38	[0.93, 2.05]	0.11
PMPM Costs, Mean $ (SD)	565(965)	566(1,118)	1.00	**377(830)**	**255(686)**	**0.08**	**$**	**259.69**	**[51.41, 467.98]**	**0.02**
Median $ (Range)	0(0-5,301)	0(0-5,142)	-----	0(0-4,684)	0(0-4,308)	-----	-----	-----	-----	-----
Prescription Drugs										
% with Any Narcotics Costs	73	73	0.92	35	40	0.26	**OR**	0.68	[0.41, 1.13]	0.14
PMPM Narcotics Costs, Mean $ (SD)	30(141)	33(168)	0.82	20(107)	38(304)	0.37	**$**	-41.79	[-118.08, 34.51]	0.28
Median $ (Range)	0(2-1,626)	0(2-2,331)	-----	0(0-1,312)	0(0-4,533)	-----	-----	-----	-----	-----
Narcotics, % with Any Prescription	73	73	0.92	68	65	0.48	**OR**	0.99	[0.60, 1.65]	0.98
Count Prescriptions PMPM, Mean (SD)	1(2)	1(1)	0.48	1(2)	1(2)	0.87	**n**	-0.21	[-0.54, 0.12]	0.21
Median (Range)	0(0-16)	0(0-7)	-----	0(0-14)	0(0-12)	-----	-----	-----	-----	-----
Anti-Depressants, % with Any Prescription	72	72	1.00	64	62	0.75	**OR**	1.15	[0.76, 1.74]	0.50
Count Prescriptions PMPM, Mean (SD)	1(1)	1(1)	0.17	1(1)	1(1)	0.64	**n**	0.05	[-0.06. 0.16]	0.35
Median (Range)	1(0-4)	1(0-4)	-----	0(0-4)	1(0-3)	-----	-----	-----	-----	-----

Anti-Anxiety, % with Any Prescription	**25**	**32**	**0.07**	23	24	0.79	**OR**	1.39	[0.85, 2.26]	0.19
Count Prescriptions PMPM, Mean (SD)	**0.1(0.3)**	**0.4(0.4)**	**0.06**	0(0)	0(0)	0.61	**n**	**0.06**	**[0.01, 0.10]**	**0.01**
Median (Range)	0(0-2)	0(0-3)	-----	0(0-2)	0(0-2)	-----	-----	-----	-----	-----
Anti-Psychotic, % with Any Prescription	38	39	0.78	33	30	0.60	**OR**	1.36	[0.67, 2.77]	0.39
Count Prescriptions PMPM, Mean (SD)	0(1)	0(1)	0.89	0(1)	0(1)	0.70	**n**	0.04	[-0.07, 0.15]	0.45
Median (Range)	0(0-7)	0(0-7)	-----	0(0-5)	0(0-5)	-----	-----	-----	-----	-----
Anti-Mania, % with Any Prescription	5	5	1.00	3	3	0.82	**OR**	0.96	[0.37, 2.52]	0.94
Count Prescriptions PMPM, Mean (SD)	0(0.1)	0(0.1)	0.97	0(0.2)	0(0.1)	0.52	**n**	0.01	[-0.01, 0.04]	0.33
Median (Range)	0(0-1)	0(0-2)	-----	0(0-2)	0(0-1)	-----	-----	-----	-----	-----
ALCOHOL AND DRUG TREATMENT										
Treatment Need, %	42	40	0.52	-----	-----	-----	-----	-----	-----	-----
Treatment Engagement, % with Any	24	24	0.92	19	17	0.56	**OR**	1.05	[0.58, 1.92]	0.86
Treatment Engagement Given Need, % with Any	-----	-----	-----	45	41	0.57	-----	-----	-----	-----
In Patient, % with Any	2	2	0.76	**3**	**1**	**0.06**	**OR**	4.09	[0.33, 49.92]	0.27
Cost PMPM, Mean $ (SD)	5(36)	6(49)	0.74	**8(54)**	**1(13)**	**0.05**	**$**	**9.39**	**[-1.45, 20.23]**	**0.09**
Median $(Range)	0(0-406)	0(0-480)	-----	0(0-514)	0(0-192)	-----	-----	-----	-----	-----
Out Patient, % with Any	14	14	1.00	11	10	0.72	**OR**	0.80	[0.39, 1.66]	0.56
Cost PMPM, Mean $ (SD)	14(69)	11(39)	0.52	12(52)	10(40)	0.70	**$**	-5.96	[-14.74, 2.81]	0.18
Median $(Range)	0(0-716)	0(0-285)	-----	0(0-502)	0(0-291)	-----	-----	-----	-----	-----
Opiate Substitution, % with Any	10	11	0.66	9	10	0.80	**OR**	1.21	[0.71, 2.07]	0.49
Cost PMPM, Mean $ (SD)	34(110)	35(107)	0.95	31(101)	30(96)	0.95	**$**	2.32	[-10.43, 15.07]	0.72
Median $(Range)	0(0-702)	0(0-390)	-----	0(0-609)	0(0-374)	-----	-----	-----	-----	-----
Assessment, % with Any	7	8	0.86	6	6	0.94	**OR**	0.94	[0.32, 2.79]	0.91
Cost PMPM, Mean $ (SD)	1(3)	1(3)	0.96	1(5)	1(4)	0.67	**$**	0.07	[-0.74, 0.88]	0.87
Median $(Range)	0(0-28)	0(0-19)	-----	0(0-37)	0(0-36)	-----	-----			
Case Management, % with Any	8	9	0.75	7	5	0.34	**OR**	1.49	[0.58, 3.80]	0.41
Cost PMPM, Mean $ (SD)	1(3)	0(2)	0.55	1(4)	0(2)	0.18	**$**	0.23	[-0.17, 0.64]	0.26
Median $(Range)	0(0-35)	0(0-15)	-----	0(0-38)	0(0-24)	-----	-----	-----	-----	-----
Detox Treatment, % with any	4	3	0.46	1	1	0.98	**OR**	1.05	[0.58, 1.92]	0.86
Cost PMPM, Mean $ (SD)	5(41)	1(8)	0.12	1(13)	1(10)	0.84	**$**	-3.01	[-8.67, 2.64	0.30
Median $(Range)	0(0-443)	0(0-62)	-----	0(0-194)	0(0-150)	-----	-----	-----	-----	-----
OTHER OUTCOMES										
Criminal Arrests and Charges										
Any Arrest, %	**10**	**5**	**0.06**	**3**	**7**	**0.06**	**OR**	**0.23**	**[0.06, 0.82]**	**0.02**
Arrests PMPM, Mean (SD)	0.01(0.04)	0.01(0.08)	0.90	0.02(0.09)	0.02(0.10)	0.47	**n**	-0.01	[-0.03, 0.01]	0.25
Median (Range)	0(0-1)	0(0-1)		0(0-1)	0(0-1)		-----	-----	-----	-----
Any Charge, %	**10**	**5**	**0.06**	**3**	**7**	**0.06**	**OR**	**0.23**	**[0.06, 0.82]**	**0.02**
Charges PMPM, Mean (SD)	0.01(0.06)	0.02(0.14)	0.78	0.02(0.10)	0.05(0.30)	0.18	**n**	-0.03	[-0.06, 0.01]	0.11
Median(Range)	0(0-2)	0(0-1)		0(0-1)	0(0-3)		-----	-----	-----	-----
Any Felony or Gross Misdemeanor Charge, %	**7**	**3**	**0.07**	**1**	**4**	**0.04**	**OR**	**0.12**	**[0.16, 0.95]**	**0.05**
Felony/GM Charges PMPM, Mean (SD)	0.01(0.03)	0.01(0.04)	0.51	0.01(0.08)	0.02(0.17)	0.31	**n**	**-0.02**	**[-0.04, 0.01]**	**0.09**
Median(Range)	0(0-1)	0(0-1)	-----	0(0-1)	0(0-2)	-----	-----	-----	-----	-----
Any AOD Arrest, %	2	2	0.74	0	0	0.32	**OR**	-----	too few observations	-----
AOD Arrests PMPM, Mean (SD)	-----	-----	-----	-----	-----	-----	**n**	-----	too few observations	-----
Median(Range)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Homelessness										
Any Homeless Months, %	11	11	0.89	7	10	0.35	**OR**	**0.55**	**[0.29, 1.03]**	**0.06**
Homeless Months, Mean (SD)	0.07(0.23)	0.08(0.24)	0.72	0.05(0.21)	0.07(0.24)	0.40	**n**	-0.02	[-0.05, 0.01]	0.11
Median(Range)	0(0-1)	0(0-1)	-----	0(0-1)	0(0-1)	-----	-----		-----	-----

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention.

[b]All multivariable models controlled for group assignment, time (pre- versus post), Dx-Rx score as a measure of condition severity, age, race/ethnicity, sex, an indicator of serious mental illness, an indicator of alcohol and drug treatment need and were weighted by the number of months of eligibility.

[c]Outcomes were estimated with ordinary least squares regression in the full sample including those with zero expenditures, visits, arrests, prescriptions etc.. Alternative modeling strategies (generalized linear models, two part models, tobit regression) accounting for the skewed distribution yielded similar results.

[d]Abbreviations: PMPM = per member per month; OR = odds ratio; CI=Confidence interval

[e] Any psychiatric admission is a roll up of state hospital and community psychiatric hospital admissions; Costs for this variable assume a fixed cost of $509.77/day for State Hospital Admissions

Appendix E: Careplan Date Analysis	PRE - PERIOD			POST - PERIOD			DIFFERENCE-IN-DIFFERENCE ESTIMATE			
	RTC Treatment n = 199	Controls n = 199	p	RTC Treatment n = 199	Controls n = 199	p		Estimate	[95% CI]	p
MEDICAL COSTS AND SERVICE USE										
Total Costs										
% with Any Costs	100	100	1.00	60	60	0.92	OR	-----	-----	-----
Medicaid Medical + Long Term Care , Mean $ (SD)	2,619(2,704)	2,400(2,643)	0.41	1,485(2,328)	1,654(3,424)	0.57	$	-585.05	[-1,436.65, 266.54]	0.18
Median $ (Range)	1,731(74-18,984)	1,555(57-13,752)	-----	605(0-14,817)	423(0-28,727)	-----	-----	-----	-----	-----
% with Any MAA Costs	100	100	1.00	60	60	0.92				
Medicaid Medical costs only, Mean $ (SD)	2,050(2,503)	1,847(2,344)	0.40	1,131(2,046)	1,361(3,081)	0.38	$	**-774.57**	**[-1587.55, 38.40]**	**0.06**
Median $ (Range)	1,129(74-18,147)	1,064(57-12,529)	-----	419(0-14,817)	301(0-24,315)	-----	-----	-----	-----	-----
Emergency Room										
% with Any Costs	67	67	0.92	25	24	0.73	OR	1.05	[0.57, 1.94]	0.87
PMPM Costs, Mean $ (SD)	123(278)	106(213)	0.51	71(221)	81(297)	0.69	$	-35.92	[-103.76, 31.92]	0.30
Median $ (Range)	38(0-2,392)	31(0-1,802)	-----	0(0-1,960)	0(0-3,075)	-----	-----	-----	-----	-----
% with Any ER Visit	67	67	0.92	25	24	0.73	OR	-----	collinearity	-----
PMPM ER Visits, Mean (SD)	0(1)	0(1)	0.43	0(1)	0(1)	0.94	n	-0.07	[-0.25, 0.11]	0.43
Median (Range)	0(0-8)	0(0-4)	-----	0(0-8)	0(0-4)	-----	-----	-----	-----	-----
Inpatient Medical										
% with Any Costs	33	37	0.40	11	14	0.36	OR	**0.48**	**[0.21, 1.10]**	**0.09**
PMPM Costs, Mean $ (SD)	802(1,819)	671(1,631)	0.45	369(1,408)	649(2,416)	0.16	$	**-700.51**	**[-1,397.03, -3.99]**	**0.05**
Median $ (Range)	0(0-12,068)	0(0-10,505)	-----	0(0-11,113)	0(0-21,334)	-----	-----	-----	-----	-----
% with any IP Admission without ER Visit	12	16	0.24	5	5	1.00	OR	-----	collinearity	-----
PMPM IP Admission (no ER), Mean (SD)	0.01(0.04)	0.01(0.04)	0.65	0.01(0.08)	0.02(0.09)	0.74	n	-0.01	[-0.02, 0.02]	0.95
Median (Range)	0(0-0.17)	0(0-0.17)	-----	0(0-1)	0(0-1)	-----	-----	-----	-----	-----
% with any IP Admission with ER Visit	31	24	0.12	8	10	0.38	OR	-----	collinearity	-----
PMPM IP Admission (with ER), Mean (SD)	0.05(0.10)	0.04(0.11)	0.44	0.03(0.13)	0.04(0.18)	0.59	n	-0.02	[-0.05, 0.02]	0.30
Median (Range)	0(0-1)	0(0-1)	-----	0(0-1)	0(0-2)	-----	-----	-----	-----	-----
Inpatient Psychiatric										
% with Any Community Inpatient Psychiatric (CIP) Costs	6	6	0.83	5	5	0.95	OR	0.93	[0.29, 2.97]	0.91
PMPM CIP Costs, Mean (SD)	46(225)	37(246)	0.72	24(118)	74(535)	0.20	$	-41.68	[-109.72, 26.36]	0.23
Median $ (Range)	0(01,820)	0(0-3,154)	-----	0(0-898)	0(0-6,618)	-----	-----	-----	-----	-----
Any State Hospital (SH) Admission, %	1	0	0.32	0	0		OR	-----	too few observations	-----
PMPM SH Days , Mean (SD)	0.01(0.13)	-----	-----	-----	-----		n	-----	-----	-----
Median (Range)	0(0-1.75)	-----	-----	-----	-----	-----	-----	-----	-----	-----
PMPM Average Cost SH, Mean $ (SD)	3(42)	-----	-----	-----	-----		-----	-----	-----	-----
Median $ (Range)	0(0-595)	-----	-----	-----	-----		-----	-----	-----	-----
Any Psychiatric (SH + CIP) Admission, %	7	6	0.67	6	5	0.87	OR	0.93	[0.30, 2.86]	0.90
PMPM Average Cost Any Psychiatric Admission, Mean (SD)	48(228)	37(246)	0.63	29(134)	74(535)	0.25	$	-39.71	[-107.88, 28.45]	0.25
Median $ (Range)	0(0-1,820)	0(0-3,154)	-----	0(0-898)	0(0-6,618)	-----	-----	-----	-----	-----
In Home										
% with Any Costs	29	22	0.11	18	15	0.34	OR	0.92	[0.58, 1.46]	0.72
PMPM Costs, Mean $ (SD)	418(797)	429(1,093)	0.91	287(724)	263(926)	0.77	$	137.20	[-28.83, 303.24]	0.11
Median $ (Range)	0(0-3,124)	0(0-9,623)	-----	0(0-3,114)	0(0-9,563)	-----	-----	-----	-----	-----
Long Term Care										
% with Any Costs	**39**	**29**	**0.04**	23	17	0.13	OR	1.04	[0.66, 1.64]	0.88
PMPM Costs, Mean $ (SD)	568(931)	553(1,177)	0.88	355(789)	292(947)	0.48	$	**189.52**	**[-19.00. 398.05]**	**0.08**
Median $ (Range)	0(0-5,142)	0(0-9,623)	-----	0(0-3,566)	0(0-9,563)	-----	-----	-----	-----	-----
Prescription Drugs										
% with Any Narcotics Costs	76	74	0.64	37	40	0.41	OR	0.69	[0.39, 1.24]	0.22
PMPM Narcotics Costs, Mean $ (SD)	32(80)	24(62)	0.51	22(112)	23(107)	0.89	$	-8.58	[-36.01, 18.84]	0.52
Median $ (Range)	0(0-1,626)	2(0-506)	-----	0(0-1,312)	0(0-1054)	-----	-----	-----	-----	-----
Narcotics, % with Any Prescription	76	74	0.64	68	62	0.17	OR	1.12	[0.64, 1.98]	0.69
Count Prescriptions PMPM, Mean (SD)	1(1)	1(1)	0.85	1(2)	1(1)	0.74	n	0.02	[-0.27, 0.30]	0.90
Median (Range)	0(0-6)	0(0-7)	-----	0(0-14)	0(0-7)	-----	-----	-----	-----	-----
Anti-Depressants, % with Any Prescription	75	73	0.73	65	65	0.98	OR	0.84	[0.53, 1.32]	0.45
Count Prescriptions PMPM, Mean (SD)	1(1)	1(1)	0.86	1(1)	1(1)	0.54	n	0.08	[-0.03, 0.19]	0.14
Median (Range)	0(0-4)	0(0-3)	-----	0(0-4)	0(0-4)	-----	-----	-----	-----	-----

Anti-Anxiety, % with Any Prescription	**25**	**35**	**0.03**	22	26	0.33	**OR**	1.21	[0.72, 2.05]		0.47
Count Prescriptions PMPM, Mean (SD)	0.12(0.30)	0.19(0.43)	0.63	**0(0)**	**0(0)**	**0.07**	**n**	0.00	[-0.06, 0.05]		0.96
Median (Range)	0(0-2)	0(0-3)	-----	0(0-2)	0(0-2)	-----	-----	-----		-----	-----
Anti-Psychotic, % with Any Prescription	38	36	0.76	32	32	0.95	**OR**	0.62	[0.27, 1.39]		0.25
Count Prescriptions PMPM, Mean (SD)	0(0)	0(0)	0.99	0(1)	0(1)	0.92	**n**	-0.01	[-0.11, 0.09]		0.84
Median (Range)	0(0-7)	0(0-6)	-----	0(0-5)	0(0-5)	-----	-----	-----		-----	-----
Anti-Mania, % with Any Prescription	5	3	0.31	4	2	0.38	**OR**	0.79	[0.26, 2.44]		0.69
Count Prescriptions PMPM, Mean (SD)	0(0)	0(1)	0.88	0(0)	0(0)	0.19	**n**	0.02	[-0.01, 0.05]		0.25
Median (Range)	0(0-1)	0(0-2)	-----	0(0-2)	0(0-1)	-----	-----	-----		-----	-----
ALCOHOL AND DRUG TREATMENT											
Treatment Need, %				-----	-----	-----	-----	-----		-----	-----
Treatment Engagement, % with Any	23	21	0.63	20	16	0.24	**OR**	1.14	[0.42, 2.36]		0.72
Treatment Engagement Given Need, % with Any	-----	-----	-----	49	37	0.14	-----	-----		-----	-----
In Patient, % with Any	2	3	0.74	3	2	0.33	**OR**	2.48	[0.35, 17.52]		0.36
Cost PMPM, Mean $ (SD)	5(37)	10(73)	0.35	9(58)	3(25)	0.17	**$**	11.08	[-2.92, 25.09]		0.12
Median $(Range)	0(0-406)	0(0-819)	-----	0(0-514)	0(0-253)	-----	-----	-----		-----	-----
Out Patient, % with Any	14	14	0.89	11	9	0.44	**OR**	1.35	[0.58, 3.12]		0.49
Cost PMPM, Mean $ (SD)	14(72)	11(51)	0.64	**12(54)**	**4(21)**	**0.08**	**$**	2.62	[-7.00, 12.23]		0.59
Median $(Range)	0(0-696)	0(0-538)	-----	0(0-510)	0(0-147)	-----	-----	-----		-----	-----
Opiate Substitution, % with Any	10	10	0.87	10	9	0.65	**OR**	1.44	[0.79, 2.61]		0.23
Cost PMPM, Mean $ (SD)	36(114)	34(110)	0.85	34(107)	25(94)	0.37	**$**	**11.37**	**[-1.04, 23.79]**		**0.07**
Median $(Range)	0(0-703)	0(0-633)	-----	0(0-594)	0(0-679)	-----	-----	-----		-----	-----
Assessment, % with Any	6	9	0.26	7	4	0.11	**OR**	3.09	[0.79, 12.07]		0.11
Cost PMPM, Mean $ (SD)	1(3)	1(3)	0.55	**1(5)**	**0(3)**	**0.04**	**$**	**0.80**	**[-0.05, 1.65]**		**0.07**
Median $(Range)	0(0-28)	0(0-19	-----	0(0-37)	0(0-23)	-----	-----	-----		-----	-----
Case Management, % with Any	8	7	0.70	6	5	0.71	**OR**	0.82	[0.30, 2.24]		0.69
Cost PMPM, Mean $ (SD)	1(4)	1(7)	0.64	1(4)	2(21)	0.45	**$**	0.42	[-0.28, 1.12]		0.24
Median $(Range)	0(0-37)	0(0-91)	-----	0(0-38)	0(0-281)	-----	-----	-----		-----	-----
Detox Treatment, % with any	4	5	0.61	1	2	0.39	**OR**	0.90	[0.15, 5.37]		0.91
Cost PMPM, Mean $ (SD)	4(33)	9(90)	0.48	1(14)	3(25)	0.45	**$**	3.98	[-8.47, 16.43]		0.53
Median $(Range)	0(0-440)	0(0-1,256)	-----	0(0-194)	0(0-320)	-----	-----	-----		-----	-----
OTHER OUTCOMES											
Criminal Arrests and Charges											
Any Arrest, %	8	10	0.49	**2**	**6**	**0.06**	**OR**	0.35	[0.07, 1.64]		0.18
Arrests PMPM, Mean (SD)	0.01(0.03)	0.01(0.04)	0.72	0.02(0.11)	0.03(0.13)	0.38	**n**	-0.01	[-0.03, 0.01]		0.23
Median (Range)	0(0-0.25)	0(0-0.42)	-----	0(0-1)	0(0-1)	-----	-----	-----		-----	-----
Any Charge, %	8	10	0.49	**2**	**6**	**0.06**	**OR**	0.35	[0.07, 164]		0.18
Charges PMPM, Mean (SD)	0.01(0.06)	0.01(0.05)	0.88	0.02(0.11)	0.04(0.16)	0.16	**n**	**-0.02**	**[-0.05, 0.01]**		**0.08**
Median(Range)	0(0-0.58)	0(0-0.42)	-----	0(0-1)	0(0-1)	-----	-----	-----		-----	-----
Any Felony or Gross Misdemeanor Charge, %	6	7	0.69	1	3	0.15	**OR**	0.31	[0.04, 2.37]		0.26
Felony/GM Charges PMPM, Mean (SD)	0.01(0.03)	0.01(0.03)	0.98	0.01(0.09)	0.02(0.12)	0.28	**n**	**-0.01**	**[-0.03, 0.002]**		**0.10**
Median(Range)	0(0-0.33)	0(0-0.17)	-----	0(0-1)	0(0-1)	-----	-----	-----		-----	-----
Any AOD Arrest, %	2	2	1.00	0	1	0.16	**OR**	-----	too few observations		-----
AOD Arrests PMPM, Mean (SD)	0.001(0.01)	0.001(0.01)	0.72	-----	0.01(0.06)	0.18	**n**	0.01	[-0.02, 0.044]		0.23
Median(Range)	0(0-0.1)	0(0-0.2)	-----	-----	0(0-1)	-----	-----	-----		-----	-----
Homelessness											
Any Homeless Months, %	10	11	0.62	7	6	0.89	**OR**	1.06	[0.45, 2.52]		0.89
Homeless Months, Mean (SD)	0.07(0.24)	0.07(0.24)	0.88	0.05(0.21)	0.06(0.23)	0.80	**n**	0.00	[-0.04, 0.03]		0.86
Median(Range)	0(0-1)	0(0-1)	-----	0(0-1)	0(0-1)	-----	-----	-----		-----	-----

[a]Difference-in-difference estimates were derived from the estimate associated with the interaction term for Time (pre versus post) X Group (treatment versus comparison) and are interpreted as the difference in the outcome from the pre-period to the post period for the treatment group relative to the comparison group. Difference-in-difference estimates take into account the fact that the treatment and control groups may begin with different levels of the outcomes in the pre-period and that changes may occur over time independent of those associated with the intervention.

[b]All multivariable models controlled for group assignment, time (pre- versus post), Dx-Rx score as a measure of condition severity, age, race/ethnicity, sex, an indicator of serious mental illness, an indicator of alcohol and drug treatment

[c]Outcomes were estimated with ordinary least squares regression in the full sample including those with zero expenditures, visits, arrests, prescriptions etc.. Alternative modeling strategies (generalized linear models, two part models, tobit

[d]Abbreviations: PMPM = per member per month; OR = odds ratio; CI=Confidence interval

[e] Any psychiatric admission is a roll up of state hospital and community psychiatric hospital admissions; Costs for this variable assume a fixed cost of $509.77/day for State Hospital Admissions